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IRON ORE OUTPUT—A VIEW OF THE NEW YEAR.

Final figures regarding iron ore shipments on the great lakes during the season just closed are not yet available, but reports at hand indicate that the total output of the Lake Superior region, lake and rail, for the year 1900 will be about 18,750,000 gross tons, as against a total of 18,251,804 tons in 1899. The total of twenty millions, which was quite generally expected in the boom days of last winter, might possibly have been mined and moved if it were not for the marked reaction that occurred in the iron industry during the summer, but it is nevertheless quite true that the old range mines were taxed in production to about their full limit. The increase is entirely in Mesabi ores, which might have been produced on even a larger scale, but it is of course understood that until more of the Mesabis can be used in furnace mixtures the production of these ores will be limited by the extent to which old range ores may be had. The shipments of ore in the month of November were a decided disappointment as compared with November of last year. In the movement of freight through the St. Mary's Falls canals November was also disappointing. Up to Dec. 1 the canal traffic aggregates 25,270,538 net tons, against 25,255,810 tons for the full season of 1899. December shipments through the canals will not be sufficient to bring the 1900 total up to 26,000,000 tons, and although there is a marked increase over any previous year, the gain is not at all what was expected. Estimates early in the season placed the canal traffic at full 27,000,000 tons.

It is not probable that representatives of the ore interests will meet to talk of prices of ore for another year until the latter part of January, and there is therefore nothing as yet to indicate what lake freights may be. The vessel interests are, however, hopeful of securing better rates than were expected two months ago, on account of the large volume of orders already booked in iron and steel lines. It is said that in steel rails alone contracts involving 1,000,000 tons have been closed within the past six or eight weeks. Business already on the books of iron and steel manufacturers gives assurance of a very active new year.

COMING MEETING OF THE LAKE CARRIERS.

The annual meeting of the Lake Carriers' Association in Detroit, fixed to open Jan. 16 at the Cadillac hotel, promises to be one of the most important gatherings of vessel interests ever held on the great lakes. Alike to the leaders of big industrial organizations of the country, the lake carriers realize that they are to meet during the coming year important problems from a labor standpoint, on account of the spread of organization in labor lines of late, and they have not been idle on this score. The vessel men propose to meet this labor problem on very broad lines, probably taking the initiative in encouraging the organization of employees within the limits of certain safeguards that have proven successful in Europe. Committees have been at work and a radical departure on the subject will very probably be presented to the Detroit meeting, but until plans have been worked out it is thought advisable not to give publicity to the scheme.

At a meeting of the executive committee of the association in Cleveland a few days ago, it was decided to invite to the Detroit meeting all members of the army engineer corps on the lakes who have charge of river and harbor work and the construction of light houses, as well as the light house inspectors. Col. Wm. P. Anderson, engineer of the Canadian department of marine and fisheries, will also be invited, and Canadian vessel owners will be asked to attend the meeting, with a view to having them join the association. As a matter of encouragement to the present movement in New York for Erie canal improvement, the executive committee adopted a resolution directing attention to the congested condition of Buffalo harbor again this fall and to the relations which the Erie canal bears to the supremacy of the route by way of the lakes and Buffalo to the Atlantic seaboard.

CARGO RECORDS, LAKE FREIGHT STEAMERS.

Iron Ore—Steamer William Edenborn, A. B. Wolvin of Duluth, managing owner, 7,446 gross or 8,339 net tons, Two Harbors to Conneaut; tow barge John Smeaton, owned by Bessemer Steamship Co. of Cleveland, 7,446 gross or 8,339 net tons, Duluth to Cleveland, draught 18 ft. 1 in.; tow barge Manila, Minnesota Steamship Co. of Cleveland, 7,300 gross or 8,237 net tons, Two Harbors to South Chicago, draught of 18 ft.

Grain—Steamer Simon J. Murphy, owned by Eddy Bros. of Bay City, 269,000 bushels of corn, equal to 7,532 net tons, South Chicago to Buffalo; steamer Superior City, A. B. Wolvin of Duluth, manager, 266,550 bushels of corn, equal to 7,463 net tons, South Chicago to Owen Sound, draught of 18 ft. 2 in.; steamer Douglas Houghton, Bessemer Steamship Co., 308,300 bushels of clipped oats and 60,000 bushels of corn, equal to 7,520 net tons, Manitowoc to Buffalo.

Coal—Steamer I. L. Elwood, owned by American Steamship Co., A. B. Wolvin of Duluth, manager, 7,688 net tons anthracite, Buffalo to Duluth; steamer J. J. Hill, owned by American Steamship Co., 7,119 net tons of bituminous, Lorain to Duluth.

TWO HUNDRED MILLIONS IN STEEL EXPORTS.

Figures from the treasury department bureau of statistics show that the exportation of manufactures of metals during the year about to end will reach \$200,000,000. For the ten months ending Nov. 1 more than \$100,000,000 worth of iron and steel, and more than \$50,000,000 worth of copper had been exported. In steel rails the exports of the year will aggregate \$12,000,000, or an average of a million per month, while it was not until 1897 that the figures for any entire year reached as much as \$1,000,000. American locomotives also go along with the American steel rails, and the total for the year seems likely to reach about \$5,000,000 in value. Exportation of cars for steam railways will amount to \$3,000,000, and for other railways \$1,000,000.

AMONG SHIP BUILDERS OF THE GREAT LAKES.

Owners of stock in the American Ship Building Co. (consolidated lake yards), are evidently expecting that its earnings will be such as to admit of the payment of a dividend on the common shares with the close of the second year's operations in July next. The common shares have been advancing steadily of late and are now up to about \$30, as against \$23 a few weeks ago. An unusually large amount of repair work will undoubtedly add largely to the company's earnings during the winter. In answer to inquiry regarding improvement in the stock it is said that if \$500,000 was earned last year after paying the guaranteed 7 per cent. dividend on the preferred stock, the surplus earnings this year should be nearly double that amount, as many of the contracts for new vessels turned out last year were taken at low prices in advance of the consolidation, and they were built in a rising market, as against consolidation prices and a declining market, to some extent, for the vessels now under construction. Another vessel for next year, the steamer Saturn, first of the Gilchrist ships, will be launched at the Lorain works Saturday, but as yet there are no berths available for new contracts, as a second Gilchrist steamer will be put down in place of this one. In naming this first vessel Saturn, Mr. Gilchrist is carrying out the scheme of giving names of the planets—Saturn, Jupiter, Mars, etc.—to the several new steamers building for his Globe Steamship Co. The managers of the consolidated yards are evidently satisfied that they will be able to secure contracts for new vessels to go to the seaboard when berths are vacant in the spring, if more orders are not found for lake carriers. The plans for a freighter to be built in two parts for passage through the Canadian canals have been so well carried out at the Cleveland headquarters that all the officials of the company are now favorable to an undertaking of this kind. The type of vessel proposed would carry about 7,000 net tons on deep draught.

In repair work the Detroit Ship Building Co. always has some advantage on account of retaining repairs on the large side-wheel steamers, nearly all of which have been built at Detroit of late years. Assembled at the Detroit works now for alterations and repairs of various kinds are the passenger steamers State of Ohio, State of New York, City of Erie, City of Buffalo, City of Alpena, City of Mackinac, City of the Straits, City of Detroit, City of Cleveland, Pennsylvania, Tashmoo, Greyhound, City of Toledo, Arundel, Frank E. Kirby, Wyandotte, City of Marquette and the freighters Roumania, Tacoma, Cumberland, Massachusetts, Elfin-Mere, Forest City, R. J. Hackett and Seattle.

GRAIN MOVEMENT FROM CHICAGO.

With high lake freights prevailing throughout the entire season of navigation in 1899, the rates on grain out of Chicago were such as to cause a very large share of the business to go to the railroads. But this year the rate by water averaged a little less than 2 cents a bushel for corn and the situation was reversed. Last year the railroads secured 59 per cent. of east bound shipments from Chicago, during the season of navigation. This year lake vessels took 58 per cent. of the same business. During the season extending from April 15, when the first grain laden ship cleared from Chicago, to Dec. 10, when the Rockefeller steamer James B. Trevor took the last load, 1,710 vessels sailed with grain cargoes. Altogether they carried 130,818,232 bushels of grain of all kinds. Shipments compared with 1899 were:

Kind of Grain.	1900, bushels.	1899, bushels.
Wheat	26,577,243	5,185,423
Corn	78,967,909	62,399,727
Oats	24,375,835	16,883,801
Rye	445,069	889,551
Barley	452,176	2,821,122

The season's grand total shows a falling off from the shipments of 1898, which were 158,263,528 bushels, but that was a phenomenal year. The percentages of eastbound traffic by lake and by the railroads since 1895 have been:

Year.	Per cent. Lake.	Per cent. Rail.
1895	53	47
1896	60	40
1897	69	31
1898	60	40
1899	41	59
1900	58	42

In these Chicago Board of Trade statistics of rail shipments all grain going out of Chicago is included, and there is an immense amount of local business which cannot be separated in the totals that would make the percentages by lake much higher if only grain going to the seaboard could be considered.

LOSSES OF VESSEL PROPERTY.

It is the custom of the Marine Review to present with the close of each season a statement of vessel losses on the great lakes, making comparisons with previous seasons. Such a list has been prepared for the past season and might be printed in this issue, but as some vessels are still in commission, with the possibility of further losses, the table is withheld, as information of this kind is of no special value unless it is complete.

Arrangements are being made for the underwriting of the stock of the Cramp Ontario Steel Co., Ltd., which proposes to erect blast furnaces and a steel plant at Collingwood, on Georgian bay. The capital stock is to be \$5,000,000, of which \$2,000,000 is to be 7 per cent. cumulative preferred stock. Walter Kennedy of Pittsburg has been engaged as the consulting engineer, but matters have not progressed sufficiently to permit a statement in detail as to what will be built. One or two blast furnaces will be erected.

THREE PROTECTED CRUISERS.

A DESCRIPTION OF THE VESSELS WHICH ARE IN EFFECT SECOND-CLASS ARMORED CRUISERS—COMPARISON OF THEM WITH THE BRITISH ESSEX CLASS.

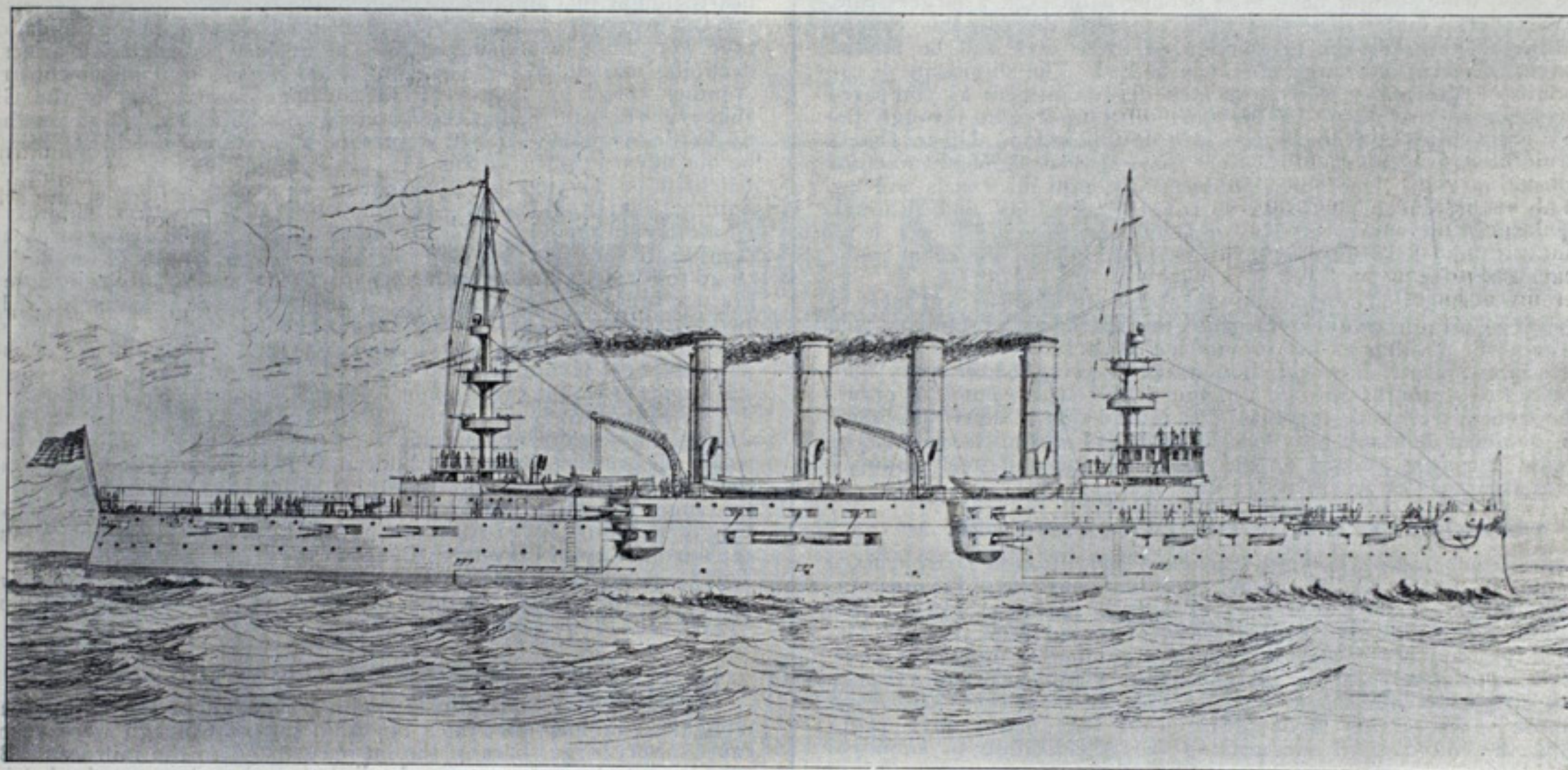
Since the beginning of the "New Navy" the United States has steadily advanced in warship construction until at the present time she is recognized as one of the great naval powers. Instead of following in the wake of foreign nations, they now seek and follow American ideas. The size of the United States navy has not increased in the same proportion as those of the other powers, but in design, material, equipment and efficiency it is the equal, if not the superior, of any navy in the world. In the latest additions to the navy there are fourteen vessels, consisting of five battleships of about 16,000 tons displacement, six armored cruisers of about 15,000 tons displacement, for which bids are now being examined, and the three protected cruisers of about 10,000 tons displacement, for which bids will be opened in January. The protected cruisers, named the St. Louis, Milwaukee and Charleston (the latter to continue the name of the 3,700-ton vessel wrecked Nov. 2, 1899, off Kamiguin island in the Philippine group), are the most formidable of their class in the world. In fact, so

sisting of eight 6-in. rapid-fire guns, twelve 14-pdr. rapid-fire guns and four 1-pdr. rapid-fire guns. Sixteen rapid-fire guns are stationed on the superstructure deck and bridges, and the remainder of the battery are located in the fighting tops of the two military masts. Additional platforms are built upon the masts to accommodate the two search lights. Electric ammunition hoists are designed to supply the guns with the greatest rapidity, making it possible to hurl against an enemy a broadside of about twelve tons of metal per minute.

The four lofty smoke-stacks extending to a height of 76 ft. 6 in. above the normal load water line provide draft for the sixteen straight water tubular boilers located in four water-tight compartments, and together with the engines protected by the side armor, sloping deck armor and a 12-ft. coal bunker.

The inner bottom of these vessels extends to the under side of the protective deck. Above the protective deck a cellulose cofferdam 30 in. wide and 41 in. above the normal load water line extends throughout the length of the vessel.

In the construction and equipment of the St. Louis class as small a quantity as possible of wood is to be used, and wherever used it is to be electric fireproofed. Each vessel of this class is fitted to accommodate a



THE MILWAUKEE CLASS OF PROTECTED CRUISERS.

close do they approach the type of second-class armored cruisers that they might easily be mistaken for such. In an engagement they will prove themselves a match for some of the armored cruisers of other navies. A comparison of their principal data with that of the British Monmouth class will demonstrate their value:

flag officer and staff in conjunction with the regular complement. In commission the number of officers will be thirty-nine and the crew will number 525 men, for which are provided sixteen boats, ranging from a 36-ft. steam cutter to a 16-ft. dinghy, and in addition to these, two 12-ft. punts and two life rafts will be carried. These boats are stowed in chocks

UNITED STATES.

St. Louis, Milwaukee, Charleston.	
Length on L. W. L.....	424 ft.
Breadth, extreme	66 ft.
Trial displacement	9700 tons.
Mean draught at normal displacement.....	23 ft. 6 in.
Engines, twin screw, I. H. P.....	21000
Speed	22 knots.
Normal coal supply.....	650 tons.
Coal bunker capacity.....	1500 tons.
Armament	14 6-in. R. F. guns.
	18 14-pdr. R. F. guns.
	12 3-pdr. R. F. guns.
	4 1-pdr. automatic.
	8 1-pdr. R. F. guns.
	2 3-in. R. F. field guns.
	2 machine guns, 30 caliber.
	8 automatic guns, 30 caliber.
Protection ...	Main side armor.....
	Lower casemate armor.....
	Upper casemate armor.....
	6-in. gun protection.....
	Conning tower and shield.....
	Signal tower
	Splinter bulkheads
	Protective deck

GREAT BRITAIN.

Monmouth, Essex, Kent, Bedford.	
Length	440 ft.
Breadth	66 ft.
Displacement	9800 tons.
Draught	24 ft. 6 in.
Engines	22000
Speed	23 knots.
Coal supply	800 tons.
Coal bunker capacity.....	1600 tons.
Armament	
4 6-in. R. F. guns in turrets.	
10 6-in. R. F. guns in casemates.	
10 12-pdr. R. F. guns.	
3 3-pdr. R. F. guns.	
8 machine guns.	
4 in. tapering to 2 in. at bow.	
4 in.	
2 decks—1¼ in. and ¾ in.	

The act authorizing the St. Louis class states that these vessels shall carry "the most powerful ordnance for vessels of their class and to have the highest speed compatible with good cruising qualities and great radius of action." All these qualifications have been embodied in the design for these vessels. The general appearance of these cruisers suggests that trite quotation "a thing of beauty is a joy forever." "Beauty" and "joy" applied to these vessels means easy lines, graceful exterior, speed and the ability to sustain that prestige upon the sea which has been maintained by the navy of the republic since its origin.

The main deck of these cruisers is supplemented amidships with a covered superstructure, within which are located four 6-in. rapid-fire guns and six 14-pdr. rapid-fire guns; outside the superstructure are two more 6-in. rapid-fire guns, located on the center line, one forward and the other aft. On the gun deck the greater portion of the battery is located, con-

on the superstructure deck and swung out by four cranes. All the latest and best improvements in construction and equipment are to be provided for the accommodation and comfort of the officers and crew.

TO RAISE PERRY'S FLAGSHIP.

The hull of the old Niagara, the flagship of Commodore Perry in the battle of Lake Erie, lies at the bottom of Presque Isle bay near the city of Erie. Representative S. A. Davenport of Erie has introduced a bill in the house of representatives authorizing the secretary of the navy "to raise, repair, house and preserve the ship Niagara, commanded by Commodore Perry, and to move her to some safe and secure place in proximity to the United States life saving station on the shore of Presque Isle bay where she may be preserved as a relic of the war of 1812." The sum of \$20,000 is appropriated to pay the expenses.

EXPANSION OF THE CRAMPS.

THE SIGNS PORTEND THAT THEY WILL ADD ARMOR AND ARMAMENT MAKING TO THEIR PLANT.

During the past week there have been many rumors to the effect that the English firm of Vickers' Sons & Maxim would absorb the Cramps of Philadelphia. These rumors are incorrect as far as absorption are concerned. It is really a case of expansion. Negotiations are pending whereby the Cramps will add armor and gun making to their output so that a battleship may leave their yards complete. By all signs the deal is well along toward completion. Mr. Charles H. Cramp has made the following statement regarding the plans of his company:

"Without going into details, or without stating the principal directions in which I have been endeavoring to operate, I will say that the idea underlying all my efforts has been to enlarge as much as possible, under our single management, all the diverse industries which enter into the construction of a ship-of-war, in order that we may realize to the best advantage all the experience which we have gathered in two generations. What I have tried to do, and what I am trying to do, and what I may do, is simply a straightforward business transaction, calculated to improve the facilities of our establishment in all directions. It must be distinctly understood that this is a totally different proposition from a combination or consolidation of ship yards themselves. It is indeed in the opposite direction, from the fact, if successful, it would conduce to the more perfect independence of one ship yard. So far as the invocation or calling in of what the Chinese call the 'foreign devils' is concerned, that is a matter not worth consideration. There is not a business in this country, from the greatest railroad down, that has not invited foreign investment to a certain extent, but always retaining American control. You may rely upon it that whatever enlargements may be effected, or whatever cognate or contributory industries may be absorbed, the control and management must be American, and so long as I live and am able to do business, will remain under my auspices.

"In addition to the above statement I am able to say on undisputed authority a movement will be consummated within the next sixty days that will place the Wm. Cramp Ship & Engine Building Co. at the front of the great ship building establishments of the world. It will, in its enlarged capacity, be enabled to build, equip and arm the greatest warship that ever floated, and this without going outside its own allied establishments for an ounce of material other than raw material. Negotiations have been in progress for several months past, and they contemplate the addition to the present establishment of an armor plate factory and a gun-making plant. It is in connection with the latter that the Vickers' Sons & Maxim interests are involved. The negotiations that are under way contemplate securing the American rights to the Maxim patents. In return for these rights Vickers' Sons & Maxim will acquire an interest, but not a controlling interest by any means, in the enlarged Cramp establishment. Thus far only preliminary negotiations have been carried on. Before any definite agreement can be arrived at, there must be a valuation placed upon the properties which it is proposed to consolidate under the Cramp management. This is only an ordinary business precaution and transaction, and is a necessary preliminary to all negotiations. The work of taking inventories, of examining books and contracts, and making estimates on property valuations is now in progress, but it is a work of vast proportion and very slow. If any of the large armor plate and steel concerns enter this combination, as there are reasons of the most substantial character to believe, they will be greatly enlarged. This enlargement will be necessitated by the manufacture of ordnance consequent upon the acquisition of the Maxim patents.

"The vital interest to Philadelphia in connection with this enlargement lies in the fact that it will give additional employment to thousands of workmen. What the Carnegie company is to Pittsburgh and vicinity, the Cramp company will be to Philadelphia. It will be the second largest industrial establishment in the western world in point of persons employed. A similar instance of the consolidation of interests, to that contemplated by the Cramp company, was in the case of the Carnegie Steel Co. and the H. C. Frick Coke Co. This consolidation, which occurred a dozen years ago, was brought about by Andrew Carnegie through his negotiations with H. C. Frick, whereby the coke company with all its mines, ovens, rolling stock and property generally, was absorbed by the Carnegie company, though remaining under Mr. Frick's management. Subsequently the Carnegie company acquired a number of blast furnaces controlled by independent corporations, and from these mergers grew the gigantic corporation of today under Carnegie's name.

"The work of bringing about this extension of the Cramp company is a necessarily slow process by reason of the vast interests involved, as well as the distance that separates some of those interested in the negotiation. It will be several weeks before the preliminary steps and examinations have been completed, and then the next step will be a conference of the attorneys of all parties in interest which will take place in London early in January. It can be asserted positively that no definite conclusions can be arrived at before the first of the year. Within a very short time, however, after January, if there is nothing to mar present plans or interfere with the negotiations in prospect, the enlargement of the Cramp establishment will have been completed and one of the greatest industrial enterprises of modern times will have been launched."

A cable dispatch to the New York Sun from London describes the situation across the water as follows:

"It may or may not be true that the Wm. Cramp & Sons Ship & Engine Building Co. and Vickers' Sons & Maxim will consolidate, but it is a fact that certain leaders of England's greatest industry are contemplating a radical change of policy which is of the utmost importance to American interests. They realize the hopelessness of competition in certain lines with American manufactures under the present industrial condition of this country. They know also that those conditions can be changed only by a gigantic struggle with the labor unions, which must bring disaster to both sides. They, therefore, are seriously considering the project of buying up the best American enterprises and transferring the greater part of their business to the American factories thus purchased. This policy involves the confession that American competition is invincible, but it also spells ruin to the industrial interests in several lines of British trade. The question of its advantage or disadvantage to America

is a matter of the greatest moment. There is not the slightest doubt that the most enlightened English manufacturers understand far better than the Americans themselves the vast opportunities within reach of the United States for securing a great share of the world's trade. Moreover, Englishmen are accustomed to make plans extending much farther into the future than those of the average American business man.

"The effect of these conditions will be that if British manufacturers and capitalists undertake to get control of American enterprises they will be sure to offer tempting and even absurd prices, according to the present valuations. No capitalization in reason, for instance, would be too high to put upon the Cramp ship yards, because there is no limit to the expansion of business which can be undertaken immediately. English capitalists are fully convinced of this, but they hope the American investing public will not realize it. More than one American concern just launching out in foreign trade is likely soon to be tempted by the offer of a fancy price in British gold, which will be accompanied probably by an invitation to the present management to remain in control. English inventors have far too high an opinion of American brains to think of supplanting them, and, above all, they do not dream of discarding American workmen. In fact, it is the superior intelligence and energy of American skilled labor which chiefly induces English capital to consider the abandonment of the home field and go where ambition has the fullest scope and progress is the watchword among employees as well as employers. Those who have most to fear from the carrying out of this design are, of course, the laboring classes of England. How long it will be before their eyes are opened and they abandon their restrictive, antagonistic fallacies, will depend, of course, on the extent to which trade is diverted to American factories by their present employers. It is obvious, however, that the crisis in English industries will be hastened and the present unexampled opportunities for American trade in the English markets correspondingly curtailed. The immediate question for Americans is: Shall English capital secure a large share of the vast profits of American enterprise and labor?"

PROGRESS OF NAVAL CONSTRUCTION.

Following is the monthly summary of the progress of construction on vessels building for the United States navy:

BATTLESHIPS.		Degree of completion, Per cent.	
		Nov. 1.	Dec. 1.
Illinois	Newport News	86	87
Alabama	Cramp & Sons	99	99+
Wisconsin	Union Iron Works	97.5	98+
Maine	Cramp & Sons	37	38
Missouri	Newport News	17	19
Ohio	Union Iron Works	32	35

SHEATHED PROTECTED CRUISERS.

Denver	Neafle & Levy	31	34
Des Moines	Fore River Engine Co.	9	11
Chattanooga	Lewis Nixon	13	15
Galveston	Wm. R. Trigg Co.	2	4
Tacoma	Union Iron Works	7	11
Cleveland	Bath Iron Works	25	31

MONITORS.

Arkansas	Newport News	43	45
Nevada	Bath Iron Works	71	74
Florida	Lewis Nixon	51	54
Wyoming	Union Iron Works	53	61

TORPEDO BOAT DESTROYERS.

Bainbridge	Neafle & Levy	81	84
Barry	Neafle & Levy	79	82
Chauncey	Neafle & Levy	79	82
Dale	Wm. R. Trigg Co.	84	86
Decatur	Wm. R. Trigg Co.	83	86
Hopkins	Harlan & Hollingsworth	68	68
Hull	Harlan & Hollingsworth	68	68
Lawrence	Fore River Engine Co.	98	99
MacDonough	Fore River Engine Co.	97	97
Paul Jones	Union Iron Works	78	79+
Perry	Union Iron Works	80	82
Preble	Union Iron Works	78	79+
Stewart	Gas Engine & Power Co.	38	40
Truxton	Maryland Steel Co.	43	47
Whipple	Maryland Steel Co.	42	46
Worden	Maryland Steel Co.	42	46

TORPEDO BOATS.

Stringham	Harlan & Hollingsworth	98	98
Goldsborough	Wolff & Zwicker	99	99
Bailey	Gas Engine & Power Co.	98	99
Bagley	Bath Iron Works	95	96
Barney	Bath Iron Works	97	98
Biddle	Bath Iron Works	85	92
Blakely	Geo. Lawley & Son	96	97
DeLong	Geo. Lawley & Son	96	97
Nicholson	Lewis Nixon	81	82
O'Brien	Lewis Nixon	84	85
Shubrick	Wm. R. Trigg Co.	96	97
Stockton	Wm. R. Trigg Co.	97	97
Thornton	Wm. R. Trigg Co.	90	92
Tingey	Columbian Iron Works	64	67
Wilkes	Gas Engine & Power Co.	60	63

SUBMARINE TORPEDO BOATS.

Plunger	Lewis Nixon	0	0
Adder	Lewis Nixon	8	15
Grampus	Union Iron Works	0	0
Moccasin	Lewis Nixon	7	10
Pike	Union Iron Works	0	0
Porpoise	Lewis Nixon	7	9
Shark	Lewis Nixon	7	9

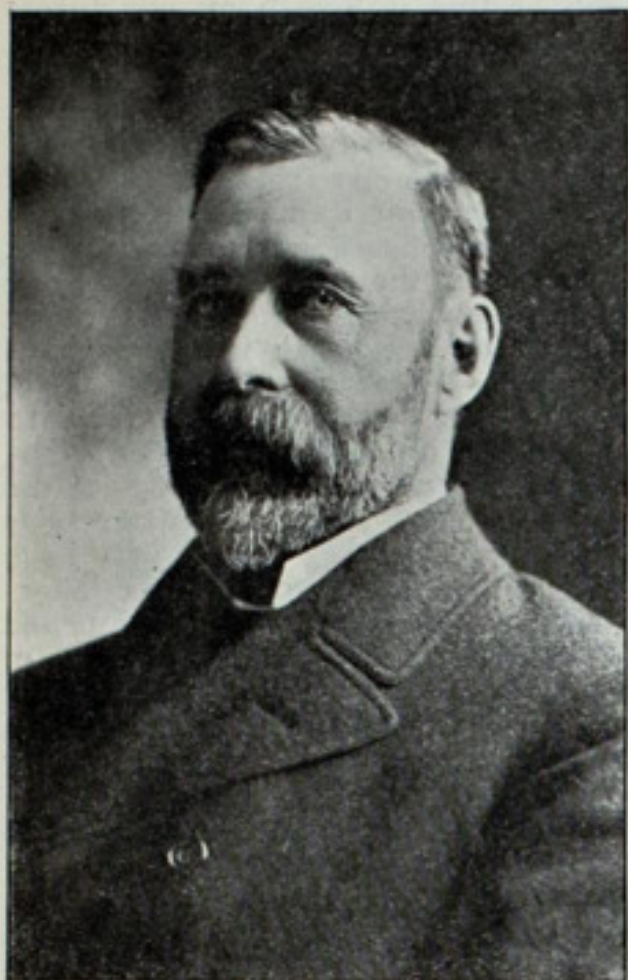
A WONDERFUL SHOWING WITH WATER TUBE BOILERS.

A clipping from one of the leading German newspapers, just received at the office of the Marine Review, contains the following:

"According to the report of the Messageries Maritimes Co. the steamers of that company, which are provided with water tube boilers of Belleville type, have covered during the last ten years of travels on the high seas in Australia, Polynesia, South America, West Africa and East Asia, a total distance of 1,217,821 marine leagues. Out of this total the ships covered in 1899 a distance of 218,889 marine leagues. The space of time and the enormous number of marine leagues run during the period should attract the attention of those who are interested in the adoption of the best type of boilers for ships."

MONUMENT TO CAPT. J. W. GILLMAN.

Chicago, Ill., Dec. 12.—The unveiling of a monument to the memory of the late Capt. J. W. Gillman took place at Graceland cemetery in this city on Sunday last. A few remarks, well chosen for the occasion, were made by Mr. W. H. Cochrane of the Goodrich Transportation Co.'s pas-



senger department, who was called upon rather unexpectedly, owing to the unavoidable absence of one who was to address the friends and relatives assembled at the grave.

"We are assembled here," Mr. Cochrane said, "to assist in the ceremony of unveiling this beautiful monument, which has been erected by those present to perpetuate and honor the memory of our departed friend and associate in business, Capt. John W. Gillman. I can hardly say anything about his good, upright character and sterling qualities which is not already known to you. It should be a source of satisfaction to all, to look upon this work of the sculptor's art and realize that it has been erected in so short a time after the death of our friend. In this busy, rushing age of progress I think it speaks volumes for the love and esteem in which Capt. Gillman was held to see so many present on this occasion, ten months after his mortal remains were laid away. Our late friend, as you all know, was a

gentleman from the ground up, and the very soul of honor. He had many excellent qualities and a personal magnetism that is very rarely met with."

The weather was very cold, and upon the conclusion of Mr. Cochrane's remarks, who of course suggested that it would be a pleasure to hear from others at the cemetery, the monument was unveiled without further ceremony. In spite of the bitter cold weather there were over 100 present at the cemetery, among them the Goodrich line manager, superintendent, chief engineer, Chicago agent, and agents from distant parts, as well as quite a number of ladies.

Capt. Gillman, who was superintendent of the Goodrich Transportation Co., died Jan. 31 last aboard a Chicago & Northwestern train on the way from Chicago to Manitowoc. A sketch of his life appeared in the



Marine Review of Feb. 8. The funeral was largely attended by Goodrich line employees and friends, a special train being run from Manitowoc, 160 miles distant. It was resolved among his business associates that something should be done to perpetuate his memory. W. J. Wood, naval architect with the Goodrich Co., was the leading spirit in the movement. He was delegated to act as trustee for a monument fund. This meant that he had everything to do with the work—collection of subscriptions, selection of design of monument, the letting of a contract for it, etc. In answer to congratulations upon the success of the undertaking he says

that his satisfaction is first in having served the memory of one deserving of greater honor, and second in the fact that it was entirely an affair of associates of the deceased. A scroll containing names of subscribers to the monument fund, from the highest to the lowest of the Goodrich employees, as well as a copy of the Marine Review containing a sketch of the life of Capt. Gillman, were enclosed in a copper casket placed within the monument under the capstan. The monument was made by Sherman & Flavin, Chicago, from a design furnished by their architect, John Meyer.

DEATH OF HAMILTON J. MILLS.

For upwards of thirty years Hamilton J. Mills was connected with dry dock and wooden ship yard interests in Buffalo and was known in all parts of the lakes. His death was announced from Buffalo a few days ago.



It was not unexpected. Illness had confined him to his home for a long time. He was a son of Robert Mills, who was well and favorably known in shipping circles on the lakes and who was the founder of the Mills Dry Docks, afterwards the Buffalo Dry Dock Co., and now controlled by the American Ship Building Co.

As a young man Hamilton J. Mills was engaged with R. G. Wilson & Co., who represented large anthracite coal interests at Buffalo. Later on he joined his father in the Mills Dry Docks, and until the sale of the docks on account of a concentration of ship building interests, he was secretary of the Dry Dock Association of the Great Lakes. Mr. Mills had passed his fiftieth year. He never married.

CHIEF CONSTRUCTOR OF THE NAVY.

The retirement of Rear Admiral Philip Hichborn at the close of his second term as chief constructor of the United States navy, which will occur on March 4 next, leaves vacant one of the most important official positions in the administrative economy of this country; and we are much gratified to learn that the president will appoint from among our naval constructors one who, more closely than any other, has been responsible for the creation of our new navy and its maintenance in a state of thorough-going efficiency.

Naval Constructor Bowles, who, on and after March 4, to the distinction of his new office will add that of being the youngest rear admiral in the American navy, was born in Springfield, Mass., on Oct. 7, 1858. In 1875 he entered the naval academy as a cadet engineer, but early in the course decided to become an assistant naval constructor. At his own request, made during his last year at Annapolis, he was sent for a course of study to the school of naval architecture at the royal naval college, Greenwich, England, and the system of instruction thus inaugurated has since come to be recognized as the highest prize attainable by the graduates of the naval academy. On his return, in October, 1882, he was detailed as secretary of the naval advisory board, which was then charged with the control of the design and construction of the first ships of the new navy; and it was mainly due to his efforts that several ships of extremely questionable value and antiquated design, which had already been recommended for construction, were sufficiently modified to bring them up to the standard represented in the Chicago, Boston and Atlanta, the pioneer vessels of our modern fleets. With a thorough knowledge of the principles of his profession, Mr. Bowles combines a large amount of reorganizing and administrative ability, which made itself felt conspicuously in the thorough reorganization in 1886 of the Norfolk navy yard, and later in the reconstruction and equipment of the New York navy yard, Brooklyn, to which he was detailed in 1895. His general popularity has suffered only when he has come in direct contact with the political office-seeker, whose special qualifications have never found any harmonious setting under the system of administration instituted and rigorously carried out wherever Mr. Bowles has been in charge.

Unlike his successor, the retiring incumbent of the office, Rear Admiral Philip Hichborn, is identified not merely with the new, but with the old navy. He received his commission as assistant naval constructor in 1869 and his commission as naval constructor in 1875. In 1880 he was selected as a member of the first advisory board, from which, as we have seen, proceeded the early vessels of the new navy. In 1884 he was detailed to make a special tour of the dock yards of Europe, and his valuable report to the department is considered a standard work upon the subject. In November of the same year he was ordered to Washington as assistant to the chief of the bureau of construction and repair, and also as naval constructor at the navy yard, Washington. Mr. Hichborn was appointed chief of the bureau of construction and repair in September, 1893, and four years later he was reappointed for his second term, which is now drawing to a close. It is fitting at this time to refer to the fact that the technical public is greatly indebted to the retiring chief of the bureau of construction for the unvarying courtesy with which he kept the public informed, through the technical press, as to the plans and progress of the vessels of our new navy.—Scientific American.

Two charts covering Lake Ontario and the Gulf of St. Lawrence, as well as the entire stretch of St. Lawrence River between these two bodies of water may be had from the Marine Review at \$2.75. The charts are of British admiralty make and are wonderfully clear in view of their great scope. One of them includes the Gulf of St. Lawrence and the river up to Quebec, and the other extends from Quebec to Kingston.

At a meeting of stockholders of the Pittsburg, Bessemer & Lake Erie Railroad Co., to be held Jan. 16, a lease of the railroad to the Carnegie Co. will undoubtedly be arranged upon a basis that will ensure to the common stock annual dividends equal to 3 per cent. upon the par value of \$50 per share.

AVERAGE LAKE FREIGHTS.

FIGURES RULING FROM DAY TO DAY DURING 1900 ARE, OF COURSE, VERY MUCH BELOW CONTRACT RATES, BUT THEY ARE HIGHER THAN THE DAILY RATES OF 1896 TO 1898 INCLUSIVE.

Lake freights that have ruled from day to day during the past season are, of course, very much below the basis of \$1.25 on which contracts for the movement of iron ore from the head of Lake Superior were made last winter, but it is interesting to note, nevertheless, that the averages of daily rates for 1900 are higher than they were in 1896, 1897 or 1898. The principal items are: Iron ore from Escanaba to Ohio ports, 69.5 cents; from Marquette, 78.3 cents; from head of Lake Superior, 84.5 cents; wheat from Chicago to Buffalo, 1.8 cents; wheat from Duluth to Buffalo, 2 cents; soft coal from Ohio ports to Duluth, 40.2 cents; soft coal from Ohio ports to Milwaukee, 45.4 cents. This year the averages of daily rates, especially as regards iron ore, are not of as much importance as in previous years, on account of the very large proportion of the different commodities that was moved on season contracts. Of the total movement of ore, probably 85 per cent. was on the contract basis of \$1.25 from the head of Lake Superior. Soft coal going to the head of Lake Superior was also covered largely by 50-cent contracts, probably to the extent of 1,750,000 tons, and thus the year has been one of special profits to the vessel interests on account of season contracts. The prosperous state of affairs a year ago and the action of John D. Rockefeller's representatives in bringing about the high contract rates are matters understood by everybody interested in the lake trade. Tables giving average lake freights for a great number of years past are presented herewith:

AVERAGE DAILY RATES OF FREIGHT ON THE GREAT LAKES.

	1900 Cents.	1899 Cents.	1898 Cents.
Iron ore, Escanaba to Ohio ports, gross ton.....	69.5	94.8	50.8
" " head of Lake Superior to Ohio ports, gross ton	84.5	129.5	61.0
" " Marquette to Ohio ports, gross ton.....	78.3	108.5	59.8
Wheat, Chicago to Buffalo, bushel.....	1.8	2.7	1.5
" Duluth to Buffalo, bushel.....	2.0	3.6	1.8
Soft coal, Ohio ports to Milwaukee, net ton.....	45.4	68.9	27.8
" " Ohio ports to Duluth, net ton.....	40.2	45.4	23.4
" " Ohio ports to Portage, net ton.....	41.3	56.4	29.7
" " Ohio ports to Manitowoc, net ton.....	43.6	67.0	28.5
" " Ohio ports to Sheboygan, net ton.....	43.6	66.5	27.8
" " Ohio ports to Green Bay, net ton.....	45.0	66.5	28.5
" " Ohio ports to Escanaba, net ton.....	40.0	58.2	26.4
Hard coal, Buffalo to Milwaukee, net ton.....	48.5	72.7	28.9
" " Buffalo to Chicago, net ton.....	48.5	72.7	28.0
" " Buffalo to Duluth, net ton.....	39.5	49.5	23.0
Lumber, head of the lakes to Ohio ports.....	233.7	.....	.....

AVERAGE DAILY FREIGHT RATES DURING TEN YEARS ENDING WITH 1900

	Cents.
Iron ore, head of Lake Superior to Ohio ports, gross ton.....	90
" " Marquette to Ohio ports, gross ton.....	79
" " Escanaba to Ohio ports, gross ton.....	64½
Soft coal, Ohio ports to Milwaukee, net ton.....	47
" " Ohio ports to Duluth, net ton.....	37
Hard coal, Buffalo to Chicago, net ton.....	48
" " Buffalo to Duluth, net ton.....	31
Wheat, Chicago to Buffalo, bushel.....	1.87

AVERAGE RATES ON WHEAT PER BUSHEL BY LAKE FROM CHICAGO TO BUFFALO.

Year.	Cents.	Year.	Cents.	Year.	Cents.
1860	9.89	1874	4.03	1888	2.56
1861	11.53	1875	3.42	1889	2.51
1862	10.49	1876	2.90	1890	1.96
1863	7.51	1877	3.72	1891	2.38
1864	9.58	1878	3.07	1892	2.19
1865	9.78	1879	4.74	1893	1.66
1866	12.34	1880	5.76	1894	1.27
1867	6.67	1881	3.44	1895	1.97
1868	7.14	1882	2.50	1896	1.70
1869	6.81	1883	3.41	1897	1.56
1870	5.88	1884	2.18	1898	1.53
1871	7.62	1885	2.02	1899	2.71
1872	11.46	1886	3.68	1900	1.79
1873	7.62	1887	4.13	Average 41 yrs.,	4.85

Charges to vessels for shoveling, trimming and tallying weights of grain amounted to \$4.34 per 1,000 bushels in 1900.

RANGE OF LAKE FREIGHT RATES ON WHEAT FROM DULUTH TO BUFFALO.

Year.	Rate, cents.	Year.	Rate, cents.
1900	2.0	1892	2¼@4
1899	3.6	1891	1¾@9½
1898	1.8	1890	2 @5
1897	1.75	1889	2 @5
1896	2.12	1888	2 @5
1895	3.50	1887	2 @8
1894	1¼@3	1886	3¼@8
1893	1¼@3½		

Figures for six years past represent average of daily rates for full season; previous to 1895 the rates are highest and lowest of each season.

AVERAGE FREIGHT RATES ON IRON ORE PER GROSS TON, FROM PORTS NAMED TO OHIO PORTS—TABLE COVERING WILD AND CONTRACT RATES FOR TWENTY YEARS PAST.

YEAR.	ESCANABA.		MARQUETTE.		ASHLAND AND OTHER PORTS AT THE HEAD OF LAKE SUPERIOR.	
	Wild or daily rate.	Contract rate.	Wild or daily rate.	Contract rate.	Wild or daily rate.	Contract rate.
1881	\$1 36	\$1 75	\$2 05	\$2 45	.....	.....
1882	1 04	1 40	1 26	1 75	.....	.....
1883	1 22	1 00	1 40	1 20	.....	.....
1884	87	1 10	1 08	1 35	.....	.....
1885	78	90	98	1 05	\$1 25	\$1 15
1886	1 28	1 05	1 51	1 20	1 78	1 20
1887	1 59	1 40	1 87	1 63	2 23	2 00
1888	1 05	90	1 30	1 15	1 43	1 25
1889	1 01	1 00	1 19	1 10	1 34	1 25
1890	89	1 10	1 07	1 25	1 17	1 35
1891	84	65	1 02	90	1 11	1 00
1892	74	1 00	98	1 15	1 15	1 25
1893	56	85	71	1 00	77	1 00
1894	47	60	60	80	78	80
1895	73	55	92	75	1 13	80
1896	52	70	66	95	77	1 05
1897	45	45	55	65	57	70
1898	51	45	60	60	62	60
1899	95	50	1 08½	60	1 29½	60
1900	69½	1 00	78	1 10	84½	1 25

Charge to vessel in 1900 for trimming and unloading 25 cents a ton.

Average ore rates for the entire period of twenty years; Escanaba, contract 91½ cents, wild 87½ cents; Marquette, contract \$1.13, wild \$1.08; Average for past ten years: Escanaba, contract 67½ cents, wild 64½ cents; Marquette, contract 85 cents, wild 79 cents; Ashland and other ports at the head of Lake Superior, contract 90½ cents, wild 90 cents.

AVERAGE OF DAILY RATES ON SOFT COAL FROM OHIO PORTS TO CHICAGO, MILWAUKEE, ESCANABA, DULUTH, GREEN BAY AND MANITOWOC.

Year.	Milwaukee. Cents.	Escanaba. Cents.	Duluth. Cents.	Green Bay. Cents.	Man'woc. Cents.
1891	61	52	49	.....	.....
1892	58	43	43	55	49
1893	48	40	38	50	41
1894	48½	39	37½	49½	48
1895	54	39	36½	50	51
1896	33½	27	29½	32½	32
1897	28½	29½	26	30	31
1898	28	26½	23	28½	28½
1899	69	58	45½	66½	67
1900	45	40	40	45	43½
Average for ten years.	47	39	37	45	43

Chicago rate about same as Milwaukee.

Coal of all kinds shipped in net tons and handled without charge to vessel.

AVERAGE OF DAILY LAKE FREIGHT RATES ON HARD COAL FROM BUFFALO TO CHICAGO, MILWAUKEE AND DULUTH DURING TEN YEARS PAST.

Year.	Chicago. Cents.	Duluth. Cents.
1891	56	29
1892	59	43
1893	49	29
1894	46	25
1895	59	24
1896	36	24
1897	29	26
1898	28	23
1899	73	49½
1900	48	39½
Average for ten years.	48	31

Rate to Milwaukee practically the same as to Chicago.

Hard coal is net tons and is handled without charge to vessel.

STEAMER CAPT. THOMAS WILSON AND HER COMMANDER.

One of the daily papers of the lakes pays a compliment to Capt. Joseph Woods with the close of a successful season in the steamer Thomas Wilson. The Wilson, built last winter by the Jenks Ship Building Co. of Port Huron, has proven a first-class business boat. The paragraph regarding her master follows:

"The Wilson is commanded by one of the youngest masters on the lakes—Joseph Woods, aged thirty-one. He is a nephew of the late Capt. Thos. Wilson of Cleveland, after whom the craft is named. He graduated from one of the eastern universities, but injured his health in doing it, and came to the lakes for new vitality. He shipped as watchman on one of his uncle's boats and took on a new lease of life from then on. In time he was made second mate, and when the steamer Andrew Carnegie came out he was appointed her first mate. Later Capt. Wilson and others bought the Volunteer and he was advised to appoint the young mate as her master. He hesitated because of possible criticism, but finally consented, and never regretted the step. Woods made a record with the craft and when the Wilson came out he was her legitimate commander and got the position. He has been hustling her since then, and making records with nearly every trip. Capt. Woods is the reverse of the lake mariner in appearance. Six feet two inches tall, lank, lean and wiry, pale and clean shaven, he appears like a preacher or professor out of his element. He has an A1 education as might be supposed, is thoroughly versed in salt water navigation as well; is full of courage, tempered with caution and guided by skill, and is probably unsurpassed in his business, though so young in age."

"CECIL RHODES OF CANADA."

TITLES ARE FALLING THICK AND FAST UPON FRANCIS H. CLERGUE OF SAULT STE. MARIE, ONT.—ANOTHER SKETCH OF HIS DEVELOPMENT OF VARIOUS INDUSTRIES—MOST ENERGETIC AND RADICAL OF THE GREAT ENTERPRISES OF THE AGE.

The man must be wide awake who can keep track of the numerous enterprises that Francis H. Clergue is inaugurating at the "Soo," and can follow the operations of the great eastern syndicate that has backed Mr. Clergue with its faith and millions. Within the month this "Cecil Rhodes of Canada," as the dominion is beginning to term him, has broken ground for what will be one of the largest steel rail and plate mills of the American continent, and designed to make a steel not rolled anywhere else, a steel for rails and plates of the famous nickel alloy so noted as harder and more durable than any other. He has completed arrangements to dam the Michipicoten river at its falls and to develop the 50,000 H.P. there running to waste. The falls of this stream, away off in the northern wilderness of Canada, in what was a year ago an unknown forest, are 100 ft. straight down, and 85 ft. more to the foot of the short rapids, and the volume of water is very great. They are but a few miles from the railway that Mr. Clergue has just pushed into the wilderness and near the iron mine he has opened since the commencement of the year, and will be utilized in part to provide power for these enterprises. Another new development is the opening of a gold mine on the Michipicoten, said by outsiders to be remarkably rich. Still another November development is the purchase of steamers for a line of passenger boats to run along the north shore of Lake Superior and into Georgian bay. Other plans are maturing and will be carried into effect as fast as they are needed.

All these new developments are the outcome of the original idea, under which the water power of Lake Superior was first harnessed by this remarkable man and many of them are forced upon him by the situation as he has found it, a situation in which in order that development be done and facilities be provided, he must do it and provide the means for carrying on the work. The dozen or fifteen Algoma companies associated under the parent organization are engaged in numerous undertakings. They are operating one of the largest pulp mills on the continent; they are erecting another to make sulphite pulp to the value of \$1,500,000 yearly; they are building railroads, one to Hudson bay, another through the nickel belt of Ontario, from which the nickel of the world is now produced, and another along the Michipicoten iron range that they have discovered and are opening; they are building canals to harness all the water that flows out of the greatest lake in the world, except so much as the government shall require for the movement of ships to Lake Superior; they are completing works for the production from nickeliferous pyrrhotite of sulphurous and sulphuric acid, sulphide liquor and sulphurous anhydride; they are completing works for the reduction of the roasted cinder which is a by-product of this ore into nickel steel or a ferro-nickel steel of value in the arts; they are commencing the foundation for a large blast furnace to reduce their own iron ore into pig to use in alloy with this nickel-steel for the rolling mills, for which they are now laying foundations, and they have finished a large electrolytic plant for the production of caustic soda and bleaching powder.

VARIED RESOURCES, ALL ON A LARGE SCALE.

In order to operate all these varied undertakings the company must have an immense number of varied resources, all on a large scale. It has been given by the Canadian government a grant, covered with timber and underlaid with minerals, amounting up to 1,650,000 acres. On this grant are the most extensive spruce forests yet in private hands in America, and spruce is the wood of woods for the manufacture of paper. It has bought one of the large nickel mines of the Sudbury region, capable of turning out 500 tons a day. It is opening and developing a hematite ore mine on which there are estimated to be millions of tons of excellent ore, and it is acquiring salt mines in eastern Ontario for the basis of its caustic soda and bleaching powder.

This company has completed and in service one of the largest water-power canals in Canada, giving it 2,000 H. P. On the Michigan side of the boundary it is completing a canal of 50,000 H.P. that is the largest in the United States. It is four times larger than the great American government ship canal that passes the enormous commerce of the northwest. This power canal is being cut for $2\frac{3}{4}$ miles, a channel of 25 to 30 ft. deep and 300 ft. wide for half of its length through walls of solid sandstone and the rest through heavy clay. At the upper end engineering necessities and the requirements of the navigable channel from which it takes water, have made this canal about a quarter of a mile wide, and into it the stream flows at a very low velocity. At the lower end it widens at the point of discharge to a great stream of 1,400 ft. in width, and the water, after passing down through eighty great turbines, will move on its way to Lake Huron at the rate of less than a mile an hour. The river into which it flows runs at the same point four times as fast. So, it is claimed, there will be no interference with navigation and the free steerage of vessels. Ships pass this point at the rate of more than 100 every day and the slightest obstruction would be fatal. To build this canal, all the latest and most economical contrivances have been brought into play. The digging, whether in dirt or rock, is done by great steam shovels, taking out their yards of clay or tons of rock at a dipperful. Power drills and channellers for cutting the rock as it lies in place (leaving a solid wall of the original strata), are operated by compressed air, which is distributed along the length of the work and can be tapped almost anywhere by the turn of a valve. Great pile drivers are sinking timbers for a support to the smooth timber floors and sides of the canal in places where the walls are earth, so that there will be as little friction as possible, and the water will be delivered with the practical head as close to the theoretical as skill will permit. At the lower end of this immense canal the foundations are now in for a power house of stone and concrete, to be 1,380 ft. long and 100 ft. in height and width. In this power house the water will have a fall of 17 ft. and it will be made to pass through eighty great turbines now under construction in a Massachusetts shop. These wheels will drive dynamos sufficient to give 50,000 H. P. The electrical installation will be by the Westinghouse company and of the latest design.

These two canals, one on each side of the Sault river, will not take all the water of the flow of Lake Superior in excess of what may be needed

to operate the ship locks and float vessels in the ship canals there of the United States and Canada, so work has been commenced on a third power canal for the company. This is to be of almost the same size as the Michigan canal and will be located on the Canadian side, some distance back from the river. It will not be needed for some years and will be ready then. Rock from this excavation and that of the Michigan canal is being used in the construction of the handsome but plain manufacturing buildings of the company on both sides of the international boundary. The pulp mill on the Canadian canal is of a capacity for 100 tons a day of mechanical wood pulp. The spruce comes from the company's own lands and from tracts on which the government has granted stumpage privileges at very low cost.

RAPID DEVELOPMENT OF IRON ORE PROPERTY.

Aside from the water power, pulp mill and soda decomposition works, the latter of which is a minor feature of the enterprise, the only completed industrial feature is the iron mine at Michipicoten. Two years ago there was a gold fever at Michipicoten river. It is 125 miles north of the Sault, on the shores of Lake Superior, near no settlements but a post of the Hudson Bay company, and an Indian mission. Among the many who made a track over which to reach the wilderness one prospector found, not gold, but an outcrop of hematite iron. He took the samples to Clergue, who examined the location and paid the man the price he asked. It was worth \$500, and the chance was worth that much. Men were sent in to examine the prospect more thoroughly and found a vast deposit of ore, hundreds of feet in length and width, exposed or covered only by rotting leaves and mold. Diamond drills were taken to the property and examinations made, both on land and through the ice of an adjacent lake, at whose bottom, 120 ft. down, the ore was found to continue. And then happened a marvelous thing. It was August of 1899 when it was decided that the iron must be utilized. It lay twelve miles back from Lake Superior, but the intervening distance was as rough as any mountains of the Rockies, and it was a task for the mountain engineer to build there. Winter was coming on, and during its six months continuation there would be no communication with the outside world except over 120 miles of ice or freezing, storm-swept waters. Supplies were gathered together and a scow load of men, horses, food, tools and machinery was hastily towed to the bay of Michipicoten. The forest loomed an apparently impenetrable wall; back of it rose the hills, almost straight from the water's edge, the distance to the mine was cut by ravines, beset by lakes of great depth and crossed by rivers and mountainous walls of rocks. That was in August, 1899. In July, 1900, the first cars of ore passed down out of the opened mine, over a track laid in eighty-pound steel, in cars of fifty tons capacity, pulled by 110-ton locomotives, and the ore thundered down a dock built of materials at hand into ships bought by the company and brought direct from Liverpool. Since then about 50,000 tons have been shipped to furnaces in Canada and the United States.

All the money that has been spent at the Sault and elsewhere in this great undertaking has been the result of what many termed a failure, and it has been the outcome of a brave attempt to recover for the original loss. The result is one of the greatest, if not absolutely the most important, industrial development proceeding in America today. Important not only in the \$20,000,000 that is being spent and the daily payrolls of thousands of dollars, but in the development of new and original processes of manufacture and industrial chemistry, in the utilization of hitherto wasted material, and in the improvement and use of great natural resources before valueless.

BEGINNING OF CLERGUE'S ENTERPRISES.

Some years ago, when the attention of capital was turned to the tremendous possibilities in water powers, Mr. Clergue went west for himself and some Philadelphia friends to find an available power that they might improve and make money from by the lease of horse power in quantity. The Sault Ste. Marie, with Lake Superior as its mill pond, and an available fall of 17 to 18 ft., seemed to him the most alluring prospect. He secured charters of old water power companies there and went to work. In a short time his company had 20,000 H.P. available for sale. To their surprise, no one wanted it. It was considered too far off. In order, then, to save the investment they had made, it was necessary to use the power themselves, and to this problem their attention was turned. It soon became evident that development, to be successful in that far wilderness, must proceed upon the principles of utilizing only what raw materials were at hand and of using them to the fullest extent that science would permit. It was to the woods that Mr. Clergue first turned his attention. He had been in paper mills about his home in Maine and knew the processes of manufacture. So a mill was erected. It is now making \$800,000 worth of pulp a year. At first it was impossible to sell the product at any distance on account of the difficulties in shipping. Processes were devised that remedied all this. These are carefully guarded and to this day the most conspicuous sign about the mill entrance is "no photograph instruments permitted inside."

The next step in the evolution of a great industrial scheme was natural. Sulphite pulp is worth nearly twice as much as mechanical wood. Why not make sulphite? There was no sulphur for paper mills at less price than that from Sicily, and it cost much for freight alone. Off 100 miles to the eastward were the great nickel mines, whose ore is a combination of sulphur, nickel, copper and iron. If the sulphur from this could be utilized a revolution in chemistry would be effected and a supply of raw material had at a small cost. So the chemists that had been gathered about the new concern were given the problem and put to work to solve it. They did and the company is now completing a great plant for the reduction of this nickeliferous pyrrhotite into sulphur and ferro-nickel ore. Every atom of the sulphur is eliminated. It is used in making liquor for the pulp and for various other commercial products that will be sold in competition with Sicilian sulphur. This problem solved, it was easy to erect a mill for making the sulphite pulp. This mill will be running in a few weeks. From the pyrrhotite, freed of the last atom of sulphur, there is a by-product of ore rich in nickel. This, in accordance with its lines of policy, the company proceeded to develop. There was abundance of cheap electric power. The smelting of ores by electricity without the use of fuel had been an iridescent dream of scientists. It was attacked in the complete laboratory of the company at the Sault and solved. Every one of the hard cutting tools in use at the great machine shops of this concern is made of nickel steel, reduced from its own ores by electrical smelt-

ing under its own discoveries and patents. The company has so thoroughly satisfied itself and has been able to so satisfy such people as the Krupps of the success of its electrical smelting of iron ores that it has made a contract with that firm to ship it all the output of the Sault furnaces in electrically smelted nickel steel for a term of years, up to 250 tons a day. This contract was closed more than a year ago, and so far nothing has been done under it but in the way of preparation. During the coming year, however, the company expects to begin the shipment of large quantities of steel to Essen and Magdeburg, to the Krupp works. The company is erecting furnaces to make this steel, and the buildings to house them are completed.

The nickel ore found at the company's Sudbury mines is too rich in nickel to make a hard steel without the addition of a non-nickeliferous pig iron, and here is where the company's Michipicoten mines come in. It was not until these mines were seen to be needed for this purpose that their development was commenced. In order to supply the pig iron for this admixture plans have been prepared for large blast furnaces at the Sault. Pig iron from these and ferro-nickel from the sulphur furnaces will be used in steel furnaces for the mixing of steel rails and plates, and works for the manufacture of these latter articles have been commenced within the present month. The buildings are of an aggregate length of 2,600 ft. and number several. A plant in Pennsylvania has been bought and is being torn down for shipment to the Sault.

For the separation of the copper contained in the company's Sudbury ores processes were introduced necessitating the use of sodium in quantity. An electrolytic process was perfected by the company's chemists so that in its new alkali works they are decomposing salt into its constituents. As a by-product there was chlorine. To utilize this, for nothing commercially valuable must be permitted to go to waste, the company will make a bleaching liquor, using lime water instead of lime as the carrying agent. Eastern Ontario salt mines are said to have been purchased in order to provide a source of raw material for the sodium works.

With the beginning of shipment of iron from Michipicoten the company needs ships for the work, having decided that all possible parts of the work should be in its own hands. The Canadian canals between the Atlantic and the great lakes were completed last summer. Among the first ships to pass up the lakes were four steel ore ships that had just been bought in England by the Algoma Steamship Co., a subsidiary concern of this company. This fall the first ships to pass down the canals to the ocean loaded with cargoes for delivery in unbroken bulk on the other side of the ocean were these four. Part of the cargo was pulp from the company's works and part was steel billets shipped by the Carnegie company.

When the four steamships of the Algoma Steamship Co. return to the upper lakes, next May, they will be accompanied by eight more vessels, four 3,000-ton steamships and four similar-sized barges, all now building in England for the same company. By that time, too, there will be in operation a line of three passenger ships between the Sault and Clergue's new Manitoulin railway to the east, and to his new Michipicoten railway to the northwest, so that this new company, which will then be but one year old, will fly its pennant on fifteen large vessels, all engaged in profitable trade.

It is 200 miles from the Sault north to Missanabie on the transcontinental line of the Canadian Pacific. Toward that point the Algoma Central railway is now building. Track is being laid at the rate of a mile a day. Passenger trains are now running out from the Sault for fifty miles. For the encouragement of this 200 miles of road into the wilderness the government has given 1,650,000 acres of land and all that lies upon or under it. For months the company has employed 150 of the best land lookers, cruisers, geologists and mineralogists, all examining the country so that the land to be taken under this grant will be as valuable as possible. When the road is completed to the Canadian Pacific there is a gap of 300 miles to the shores of Hudson bay. For the construction of a road this additional distance there has been offered the company a grant that will probably amount to 3,000,000 acres more. This is an empire in itself. It is not a barren northern wilderness, but a land filled with resources of value. There are vast forests of spruce, hemlock, pine and cedar, of maple, elm and birch; there are beds of limestone and lignite, of potter clay, gypsum and marl, deposits of copper, iron and gold. There is the sea at the northern end, and in five years the markets of Chicago and Minneapolis and St. Paul will be supplied with salt water food fresh from the ocean at Hudson bay. Two less ambitious railway projects are the Manitoulin & North Shore and the Michipicoten lines, the former opening the riches of Sudbury and Manitoulin and the latter the length of the new Michipicoten ore range, whose length no one yet knows.

POWER LEASES—MONEY ALREADY SPENT.

The company has leased a part of the power to be derived from its Michigan canal to the Union Carbide Co. and another part to the American Alkali Co., and the price for power to the companies is but \$10 per H.P. per year. At this figure there is a large net revenue from the canal and much power to be used in other ways. In order that the diversion of such a tremendous quantity of water as will flow through these three power canals may not permanently lower the level of Lake Superior, the company will, the present winter, begin the construction of remedial works at the head of the rapids of Ste. Marie. These are planned by its engineers, under the supervision of its consulting engineer, Alfred Noble, and will be installed under the direction of the war department bureau of engineers. It is intended that as the flow through the power canals increases, the dams of the remedial works shall be increased similarly, so that the facility of flow through one shall be offset by a retardation through the other.

There have been spent in this enterprise about \$5,000,000, and the plans call for the expenditure of about \$15,000,000 more, in addition to the road from Missanabie to Hudson bay. While the enterprise is essentially Canadian, in that its development is upon Canadian territory and of Canadian materials, the money that is flowing into it is American, largely Philadelphia, in part also from New York and Boston. The great grants of land and cash by the Canadian government have not been without a reason, for the land is to be opened and made productive and the undeveloped resources are to be made valuable, while there are to be placed each year 1,000 male settlers along the grant. These will be Englishmen. In all its various ramifications and extensions, this company has earned the right to be called one of the most energetic and radical of the great

industrial enterprises of the age. Every line it has undertaken has been the growth from the original and central idea, and as such has become a part of a well-rounded whole. There is no such thing as a dissipation of energy in a wild scattering of operations, for each fits into the rest.

MR. ALFRED WISNER ON THE SHIPPING BILL.

Mr. Alfred Wisner, president of the Boston Towboat Co. and of the Boston Steamship Co., in discussing the shipping bill said:

"In order that Americans may again own and sail ships under the American flag as our forefathers did, and regain and retain a large part of the enormous amount of money which is now paid to foreigners for the transportation of our products to other countries, amounting to over \$200,000,000 annually, I consider that it is absolutely necessary for our government to pay a reasonable and proper subsidy to build up our merchant marine and put it on a basis to compete with vessels built and sailed under foreign registers. The magnitude of the capital required to successfully enter into shipping today, as into any large transportation or other business, is so great that in the future it must be done under corporate form, as the few individuals who have the necessary means do not care to invest a large part of their capital in such a venture, as would be necessary in order to insure successful competition. Some of the reasons why the assistance of the government should be given to revive American ship building and American ownership are as follows: No assistance of the government has been given to it in the past, as there has been to other large industries. In fact, laws have been enacted and unions formed from time to time which have worked against shipping, until today it is difficult, if not almost impossible, to man either the naval or merchant service with officers and crews of American-born men. Owing to the higher wages paid in this country today, as compared with those paid in other countries, the cost of running a ship under our flag is very much greater. Of this there is no doubt. I have taken considerable care to procure crew lists of English, German and Norwegian vessels, showing the wages actually paid. I have compared these with lists showing the wages paid on ships under my charge, and I find we pay from 33 to 50 per cent. more in wages than is paid on ships of other countries, and for victualling 40 to 50 per cent. more. As most people know, the cost of building ships in other countries since the civil war, compared with the cost in this country, has averaged considerably less. The importance of having our navy manned with American citizens is evident, particularly if our government should be led into war with one or more of the great powers, as under present conditions a large percentage of the crews aboard might be subjects of those powers.

"That capitalists are ready to invest in shipping again if they can be assured that they will receive a fair return on their money there is no doubt, as is evident from facts that have come under my observation recently. There has been an expression of opinion on the part of some that the investment of capital in shipping has not been remunerative, and that it is, therefore, best that foreign capital should own and operate the ships. This I feel sure is an error. Admitting that the fluctuations in this industry are fully as great as in other mercantile ventures, I think it is a fact that, taking it for a series of years, the modern foreign steamship has paid excellent returns on the money invested, and I am convinced that, if the aid of congress can be secured in this direction, with the economies that are possible today in the building and operating of great steamships, we can once again build up a fairly large merchant marine.

"Believing, therefore, that the time for again investing capital in shipping is approaching, particularly if congress should pass a suitable shipping bill, thereby encouraging the investment of capital in the establishment of a merchant marine under the American flag, with a resulting large increase in ship yards in this country, several capitalists have decided to begin the building of two large freight vessels, to be followed by a large fleet in case this very necessary assistance is given by our government."

LEWIS NIXON ON THE SHIPPING BILL.

Lewis Nixon contributes to the December issue of the World's Work an excellent article upon the shipping bill. Among many things he says:

"I believe that, if the two great parties would join hand in hand in the building up of our merchant marine, just as they did in the case of our navy, the same gratifying results would be obtained in connection with the upbuilding of our foreign fleet as were obtained in connection with the rebuilding of the navy. It is not a political question at all, except as it is made so by those who seek partisan capital in everything that is done. From the Democratic standpoint I believe that more has been accomplished by men who were avowedly Democrats than by men who were or are Republicans. On this point the student of history will find that the first president to recommend legislation providing subsidies for American shipping was James K. Polk. The first great speech ever made in congress in favor of subsidies to American ships was delivered by William Polk of Tennessee, brother of the president and Democratic leader of the house. The first subsidy legislation for the benefit of American ships, those of the Collins line, was passed by a Democratic majority in congress and approved by a Democratic president. Only one of our presidents has ever sent to congress a message recommending a repeal of the navigation laws written by Jefferson. That president was Grant, and he withdrew the message after hearing the speech of John Kelly against such repeal. I cite these facts to show that legislation looking to the upbuilding of our commerce upon the sea is not, and can not be confined to any one party. Increasing need and resolve that we shall be no longer tributary to the nations which do our carrying are sure in time to make us, despite all obstructions, the greatest ship building and ship owning nation. History will repeat itself, and we shall again build the ships of the world, as we did when we produced the wooden fleets which gave us our supremacy upon the ocean. But a wisely framed subsidy law will make this a matter of years instead of decades."

A Boston dispatch says that Thomas W. Lawson of that city contemplates the construction of a yacht to compete in the trial races next year with the Belmont syndicate boat and the Columbia for the honor of defending the America's cup. Boston was represented in the trial races in 1885, 1886, 1887, and 1893. It is said that B. B. Crowninshield of Boston will design the Lawson yacht if it is decided to go ahead with construction of the vessel.

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A Pittsburg trade journal, the American Manufacturer, is alarmed about the effort in congress to promote our mercantile marine in the foreign trade. It publishes the following article as one of the shortcomings of the shipping bill:

"One great evil in the ship subsidy bill is the way it will work against our lake shipping interests. While we are all eager to see our ocean trade increased we must not forget the men who have done so much to make us, as far as inland commerce is concerned, the greatest maritime power on earth. A vessel sailing from Milwaukee, Chicago, or any of the lake towns to Montreal can collect nothing under the law as passed. While ships leaving New York for Montreal would get a subsidy almost equal in size to the entire freight earned by the Chicago vessel. If this is thus, and others, besides ourselves, say it is so, the bill should be reformed. Another evil is the fact that a lake ship for foreign parts could collect never a dollar unless it cleared at an Atlantic port, and then only such a run as is accorded to the mileage from said Atlantic port. A time is rapidly coming when ships will sail with coal, iron and wheat from the lake towns to ports in Europe. When that day dawns the injustice of the present subsidy law will look like a blow at Chicago, Milwaukee and the middle west. What will happen? The west will have to turn to Canada's canals and railroads. It looks as if we were turning that way now, for rumor has it that a Canadian railroad is expected to change shipping conditions. It is pointed out, pertinently, to Chicago and Duluth shippers, and other western lake ports, that by the new route, the Canadian, the distance to Liverpool is several hundred miles shorter than the lake and rail route via Buffalo and New York."

The Manufacturer may rest its soul in peace. The lake interests are not worrying because they are left out of the shipping bill. That which the lake has to send abroad by the water route is a mere bagatelle. Why, it is scarcely a handful of commerce, and it is likely to remain a handful for a great many years to come. It is true that the Carnegie Steel Co. sent a few tons of steel to England, via the St. Lawrence, but that was done because the ships were going to England anyhow. The lakes have practically nothing for the seaboard. They will not be a commercial waterway from an international standpoint until they are linked with the seas by canals of ocean draught. The shipping interests of the lakes know that they are not in a position to take advantage of the shipping bill through the shipments of cargoes abroad. But on the other hand the lake ship builders are in position to take advantage at once of the impetus which the passage of the shipping bill would give to ship building. Ships of about 3,000 tons capacity for coast service, fitted for passage through the St. Lawrence canals, can be built on the lakes as cheaply as they can be built on the seaboard, if not more cheaply. Larger ships can also be built in sections and joined at Montreal. The lakes can build on the section plan tramps of 7,000 tons capacity for salt-water service. The lake ship builder is vitally interested in the shipping bill and neither he nor the shipper wants its provisions amended in any particular. When the time comes that the lakes will have a genuine commercial waterway to the sea, then will be the time to amend the shipping bill to include cargoes from the lakes. It is surprising that the Manufacturer was not cognizant of the distinction between shipping and ship building on the lakes. But further than this, and more important also, is the fact that any measure of legislation tending to bring about increased consumption in the raw materials of iron and steel will prove helpful to the lake region. More ships building in America will require more shapes and plates, and the ore mines of Lake Superior furnish probably 80 per cent. of the ore entering into this country's product of iron and steel. American ships on the seas would increase immensely our exports of iron and steel and the transportation interests of the lakes would share in every ton of increased production of iron and steel resulting from the passage of the shipping bill.

The Review is asked occasionally whether the shipping bill will pass or not. This is one of the things that nobody knows. The success which has attended Mr. Frye's efforts in the senate leads one to the conclusion that it will pass that body speedily. It may pass the senate before the holiday recess; if not it is likely to pass early in January. As to its fate in the house there are too many elements entering into it to venture a prediction. If it can be assured of immediate hearing, and then pushed aggressively forward, it may pass. If it interferes with the river and harbor bill, the war revenue bill and the appropriation bill, which must, of course, be passed before March 4, it may be laid over until the long session. Regarding a determined opposition in the house, however, there has been much exaggeration of statement—and one of these exaggerations is the attitude of Mr. Burton. It has long been known that Mr. Burton is opposed to the principle involved in the bill. In setting forth that

simple statement in a recent interview, covering a multitude of topics, it was singled out by the newspapers and magnified—merely because Mr. Burton happens to be a townsman of Mr. Hanna. Mr. Burton is head over heels in the river and harbor bill and he is not likely to pay over much attention to the shipping bill for lack of time. If this newspaper clamor had not taken place it is extremely doubtful if he would have done more than voted against the bill. As it is now he may speak against it. Advocates of the bill have been much disappointed in the attitude of the president upon the subject. His utterances in his latest message are decided McKinleyesque. He gives such a faint indorsement as to discourage those who hoped he would be as fearless as his party. There is nothing of the leader about the president. Among the opponents of the bill, who are laymen, the latest is J. J. Hill of the Great Northern Railway, who made a speech against it in Chicago last Saturday night. Whatever Mr. Hill says is interesting and original. He thinks that the railways are the true builders of the country and are really the enterprises that should be subsidized. But we fancy there are no enterprises which have so lavishly received the benefit of a bountiful government as the railways. What are the enormous land grants, with their wealth of wood and minerals, but subsidies? The pith, and indeed the force, of Mr. Hill's argument lies in the fact that he says that he is building ships cheaper in the United States than he could get them built abroad. He says that he received tenders from both places. We are not in position to dispute his statement, but we question very much whether Mr. Hill knows what his ships which he is now building at New London, Conn., and to which he doubtless refers, will cost him. The plant was founded primarily to build these ships and the comparison is unfair.

Directors of the American Steel & Wire Co. at a meeting held in New York on Monday last ordered the payment of the fourth quarterly dividend of $1\frac{3}{4}$ per cent. on the common stock, which was declared at the beginning of the year, and declared the regular quarterly dividend of $1\frac{3}{4}$ per cent. on the preferred stock. There was no action concerning the purchase of a fleet of twelve steel steamers on the great lakes from the American Steamship Co. It was in fact understood that the directors had already passed upon and settled that purchase. The report that the courts had been asked for an injunction against the purchase of the vessels was without foundation.

ANOTHER PACIFIC DRY DOCK.

A STRUCTURE 750 FEET LONG TO BE BUILT BY THE SAN FRANCISCO DRY DOCK CO. AT HUNTERS POINT.

A notable addition to the dry dock facilities of the Pacific coast is planned by the San Francisco Dry Dock Co. at its yards at Hunters Point, San Francisco, Cal. The new dock for which plans have been prepared and the bids for construction asked will be 750 ft. long, 122 ft. wide at the coping, and 74 ft. wide at the bottom, and will have a depth at the entrance of $32\frac{1}{2}$ ft. below the coping and 28 ft. below high-water level. As will be observed from these dimensions, the dock will be one of the largest and most commodious in the world. Compared with the new masonry dry docks which are to be built by the United States government the corresponding main dimensions are as follows:

Dimensions.	Government.		California.	
	ft.	in.	ft.	in.
Length of coping.....	750	..	750	..
Width on coping.....	144	6	122	..
Width on floor.....	80	..	74	..
Depth of floor below coping.....	39	3	35	10

Plans for the new Hunters Point dock have been prepared by Mr. Howard C. Holmes, chief engineer of state harbor commissioners, San Francisco, Cal., and we are indebted to this gentleman for the drawings and information from which the following description is prepared:

The dock is located south of the present dock, with its axis veering at an angle of about 14° from the axis of the old dock. Like the old dock, it will be excavated in the solid rock of the little peninsula which forms the property of the company. This rock is green serpentine, impervious to the water and easily excavated. This rock is to be excavated to lines corresponding closely to the contours of the dock chamber so that only a thin lining of concrete is necessary to finish the chamber. For the outer end portion of the dock, where the bedrock dips under the water surface, the walls must be extended to the required height by concrete masonry side walls. These concrete side walls are to be anchored to the bedrock by means of sections of railway rails used as holding-down bolts and set every 10 ft. apart. Referring particularly to the dock chamber construction, the entire chamber will be concrete lined except for the sides of the approach, the seat for the caisson and the apron arch, which will be of cut granite masonry. There are to be sixteen altars on each side of the chamber extending from a point 100 ft. from the gate seat to a point within 150 ft. of the head of the chamber. The bottom of the chamber will have a timber flooring embedded in concrete to support the keelson, bilge ways and bilge blocks. The concrete side wall lining begins at a point at least 1 ft. below the surface of the rock bottom, and is carried up along the sides. Molds are to be used to give the proper form and dimensions to the lining, and the concrete is to be rammed into these molds in 6-in. layers. Between the concrete lining and rock surface there is to be a waterproof coating, consisting first of a coat of refined asphaltum reduced in benzine and sprayed on, and then of two coats of asphaltum applied hot. The entire surface of the concrete lining is to be plastered with a $\frac{1}{2}$ -in. coat of one cement and one sand mortar floated and troweled to a hard, smooth surface. All concrete veneers will be additionally strengthened against checking with an interstitial web of expanded metal.

In building the floor the rock bottom of the dock chamber is to be

cleaned and recessed for the sill or bilge way timbers. These sills are to be 12 by 12-in. Douglass fir timbers laid transversely across the dock 10 ft. apart and recessed 6 in. into the rock bottom, to which they are to be fastened by 7 ft. by 1½-in. anchor bolts, spaced 7 ft. apart. Running longitudinally of the dock between the sills there are to be 6 by 6-in. stringers, spaced 8 ft. apart and toe-spiked flush with the tops of the sills. The space between the sills and stringers is to be filled flush with concrete. The keelson extending longitudinally along the center line of the dock is to consist of four 12 by 12-in. yellow fir timbers, screw-bolted together and anchor-bolted to the rock bottom. The flooring is to consist of 4 by 12-in. yellow fir planking, boat-spiked to the stringers for the spaces between sills and of 4 by 18-in. Port Orford cedar plank or bilge ways for the spaces over the sills. These bilge ways will be boat-spiked to the sills and have iron guides for the bilge blocks, which are to be of laurel. On each side of the wooden flooring and at the feet of the side walls there will be a gutter built of concrete and surfaced like the side walls. Each bilge block is provided with an eye bolt, and directly opposite in the side walls are pulley blocks, these attachments being provided for the rope used in hauling the bilge blocks to one side. Belaying pins and locating pins are set into the concrete of the curb and the thread of the first steps below.

The concrete used for the lining is to be composed of 18 cu. ft. broken stone, 4 cu. ft. of sand and one barrel of Portland cement, and that for the large walls of 20 cu. ft. of broken stone, 5 cu. ft. of sand and one barrel of Portland cement. The specifications require the mixing to be done as follows: The crushed rock must first be spread on a wooden platform in layers not to exceed 6 in. in thickness; over this will then be spread first the sand and then the cement, each in its proper proportion; the bed thus formed must be turned with shovels three times while dry and once after being wet, but under no circumstances will a so-called patent or machine mixer be allowed to be used. The stone masonry is to be of first-class granite ashlar work.

The entrance of the dock is closed in the usual manner by a steel caisson. This caisson is 104 ft. 8 7/16 in. long, with a molded breadth of 22 ft. and a depth of 33 ft. 9 in. from bottom of keel to the under side of the upper deck. Both basic and acid open hearth steel will be used. The caisson is reversible and is divided into six water-tight compartments. The dock is filled through the caisson by means of thirteen 30-in. gate valves. Sea valves, 6 in. in diameter, are provided for flooding the caisson, and it will be emptied by a 3,000-gallon centrifugal pump operated by an engine and boiler carried on the caisson. The usual air ports, scuppers, capstans and other appurtenances are provided.

The power plant consists of a boiler and engine house built of brick, and respectively 40 by 90 ft. and 50 by 60 ft. in plan. The boiler room has plastered walls and a concrete floor, and the engine room has walls, floor, ceiling and roof timbers of Oregon pine with natural wood finish. Along one front of the boiler house there is a row of coal bunkers. There are to be seven water tube boilers; six of 200 H.P. each, set in three batteries of two each, and one 75 H.P., one feed-water heater, two duplex feed pumps. Each boiler is to be of not less than 200 H.P. (one horse power equals 30 lbs. of water evaporated from 60° Fahrenheit to steam at 70 lbs. pressure) and to have not less than 2,000 sq. ft. of heating surface (1,800 sq. ft. to be in tubes between headers) and 40 sq. ft. of grate surface. They are to be of the inclined straight water tube type.

There will be three 24 by 48-in. horizontal box frame, heavy duty, Corliss engines, to run at seventy revolutions per minute and develop 345 H.P. at one-fifth cut-off at 100 lbs steam pressure. Each engine will be connected to pump with a special laid endless rope 1¼ in. in diameter. Fly-wheels shall be made in sections. The main pumps, three in number, will be centrifugal double-suction, each having a 38-in. discharge and 26-in. suction pipes. The runners are to be 60 in. closed, and of the three-vane type, operating at a speed of 200 revolutions a minute. Each pump must have a capacity of 37,000 gallons per minute while pumping against a head varying from 0 to 30 ft. There will be placed in the pump pit a duplex, double-acting steam piston pump 12 in. diameter. This pump will have a capacity of 1,200 gallons per minute under a 40-ft. head. The drainage pump will be properly connected with the 75 H. P. water tube boiler. The pump pit will be 18 ft. wide, 56 ft. long, and 37 ft. deep, all inside measurements. The floor will be supported on an arch of concrete 2 ft. 3 in. in thickness, and will have in addition twelve 20-in. I-beams, 64 lbs. to the foot, for supporting pumps. The sides of the pit will be of concrete 12 in. in thickness. The ropeways will be of the dimensions referred to above, with concrete sides 9 in. in thickness and bottom of same 6 in. thick. The sides of pit and ropeways are to be plastered with equal parts of sand and cement, troweled and floated to a smooth and even surface. The sides of walls are to be attached to original rock, and all spaces to be filled with concrete. The interiors of pump pit and ropeways, when thoroughly and completely dry, are to be painted four coats with pure white lead and boiled linseed oil. The gate valves will be placed on each side of the pump pit in the suction tunnel.—Engineering News.

BIG WATERWAY SCHEMES.

BILLS IN CONGRESS KEEP THEM BEFORE THE PUBLIC, BUT THE WORK OF CARRYING THEM OUT WILL PROBABLY BE LEFT FOR OTHER GENERATIONS—NIAGARA DAM AND SHIP CANAL FROM THE GREAT LAKES TO THE ATLANTIC.

Congressman Corliss of Michigan is again trying to secure the passage of a bill which it is expected will lead up to legislation for the construction of a dam at Niagara to raise lake levels. At the last session of congress Mr. Corliss introduced a bill that provided for such a dam, but this action was evidently regarded as somewhat premature. Canada's interests on the great lakes were of course to be considered before such a project could be taken up. Now Mr. Corliss has introduced a bill in which it is provided that the president of the United States be authorized to establish the most advantageous level for navigable purposes of the waters of Lake Erie and tributary streams and the right of maintenance and control thereof by agreement with the government of Great Britain; that the president be authorized to appoint such engineers as he shall deem needful in the performance of duties hereby imposed and to fix the compensation to such engineers and employees. A maximum appropriation of \$10,000 is provided to carry out the provisions of the bill.

Mr. Corliss is also a supporter of another gigantic scheme, that of a ship canal in American territory from the great lakes to the Atlantic seaboard. Of course it is not expected by the engineering interests supporting these matters in congress that they will actually secure appropriations for the beginning of the work, but they do manage to keep up public interest in them. The report of the Board of Engineers on Deep Waterways, consisting of Lieut. Col. C. W. Raymond of the army engineer corps, Alfred Noble of Chicago and Geo. Y. Wisner of Detroit was presented to congress a few days ago. This is the board appointed to make surveys and examinations of deep waterway routes between the great lakes and Atlantic tide-waters. Its report, which is a voluminous affair, was partly made public some time ago.

It appears from the investigation of the board that the most favorable route for a 30-ft. waterway from the lakes to the sea is from Lake Erie to Lake Ontario, via Lasalle and Lewiston, and from Lake Ontario to tide water, via Oswego and the Mohawk valley; that the same route is practically favorable as any for a 21-ft. waterway. This route is entirely in our own country and has a longer season of navigation than the more northerly line. The problem of its defense is, of course, much simpler than it would be were a part of it in a foreign country, and it is available as a line of communication for ships of war. The board considered also the advisability of constructing a deep waterway by way of the St. Lawrence, by way of Lake Champlain and by the Mohawk valley. The estimated cost of a 21-ft. waterway on a low level plan is \$206,358,000; the estimated cost of a 30-ft. waterway is \$317,284,500, to which should be added about \$9,607,500 for the necessary deepening of the harbors at Duluth and Chicago, making the total cost \$326,892,000. The annual cost of maintenance and operation is estimated at \$2,343,478 for the 21-ft. waterway and \$2,930,308 for the 30-ft. waterway.

The cost of transport on a 21-ft. waterway, the board says, is about the same for domestic travel as on a 30-ft. waterway. For foreign traffic the 30-ft. waterway shows a much lower cost of transport than a 21-ft. waterway. But as a conclusion, the engineers say: "As a result of this investigation it appears that a 21-ft. waterway promises a much greater return of value relative to its cost than a 30-ft. waterway. The advantages of a 30-ft. waterway are that it would furnish with less cost the transport of products to foreign markets and permit the construction of the largest seagoing vessels on the lakes."

In the many pages of discussion contained in the report of the board, the following paragraphs appear:

Freight traffic of the great lakes, although amounting to at least \$40,000,000 a year, may be expected to increase greatly and rapidly with increase of population and the extension and cheapening of facilities for transportation, but this traffic will tend more and more to domestic markets and less and less to foreign markets. These conditions appear to fully justify the establishment of new facilities for transportation from the great lakes to the sea, either by the general government or by state or private enterprise. At the present time by far the greatest part of traffic between lake and ocean is by railroad, only about one-twenty-fifth of the volume transported by canal and river. If the new line for water transportation is to be established it must be done by the general or state government, not only on account of the great expenditure involved, but also because such a line is not so desirable for private ownership and operation as a railway upon which the carrier business can be monopolized by the owner, and therefore it probably would not be constructed by private enterprise.

In order that the consequences involved in the proposed change of the greater part of the traffic from railway to water transportation may be clearly understood, the commission gives a minute review of the subject. It is frequently asserted that water transportation is always much cheaper than transportation by rail, the commission states, but this statement cannot be accepted without qualification, it continues. It is intended to mean that the cost of transport proper is generally less in the case of the waterway than in the case of the railway, the statement is doubtless true, but if the toll is included in the cost of transport for the waterway as well as for the railway, the cost of transportation will be often less for the railway than for the waterway when the latter is an artificial channel of any dimensions. As a line of communication the railway is, for obvious reasons, almost always shorter than the water line. It is claimed as a great advantage of waterways of sufficient dimensions for navigation by ships that they permit of the transport of the cargo either to domestic or foreign ports without transfer from one carrier to another, thus saving the time and cost of handling, etc. This is an advantage of the ship canal as compared with the barge canal as well as with the railways. It is, however, considered by high authorities very doubtful whether the vessel can be so constructed as to navigate successfully and economically the ocean, the lakes and a canal.

The benefit to commerce which would result from giving access to shipping from the lakes to the sea, thus rescuing the lake fleet from enforced idleness during one-third of the year, would, of course, be enormous if the problem of constructing a vessel economically adapted to both kinds of service can be satisfactorily solved. This is a benefit which is peculiar to the waterway, and cannot be derived from the extension of railway facilities.

It is further stated that if adequate water communication with the sea were provided a great industry in the construction of steel ships would be immediately developed on the lakes. This industry is already an important one, not less than 1,258 vessels of all kinds, large and small, having been constructed at the lake ports during the past ten years, but as there is no access to the sea for vessels of more than thirteen feet draught, the business is almost exclusively confined to the construction of ships for lake service.

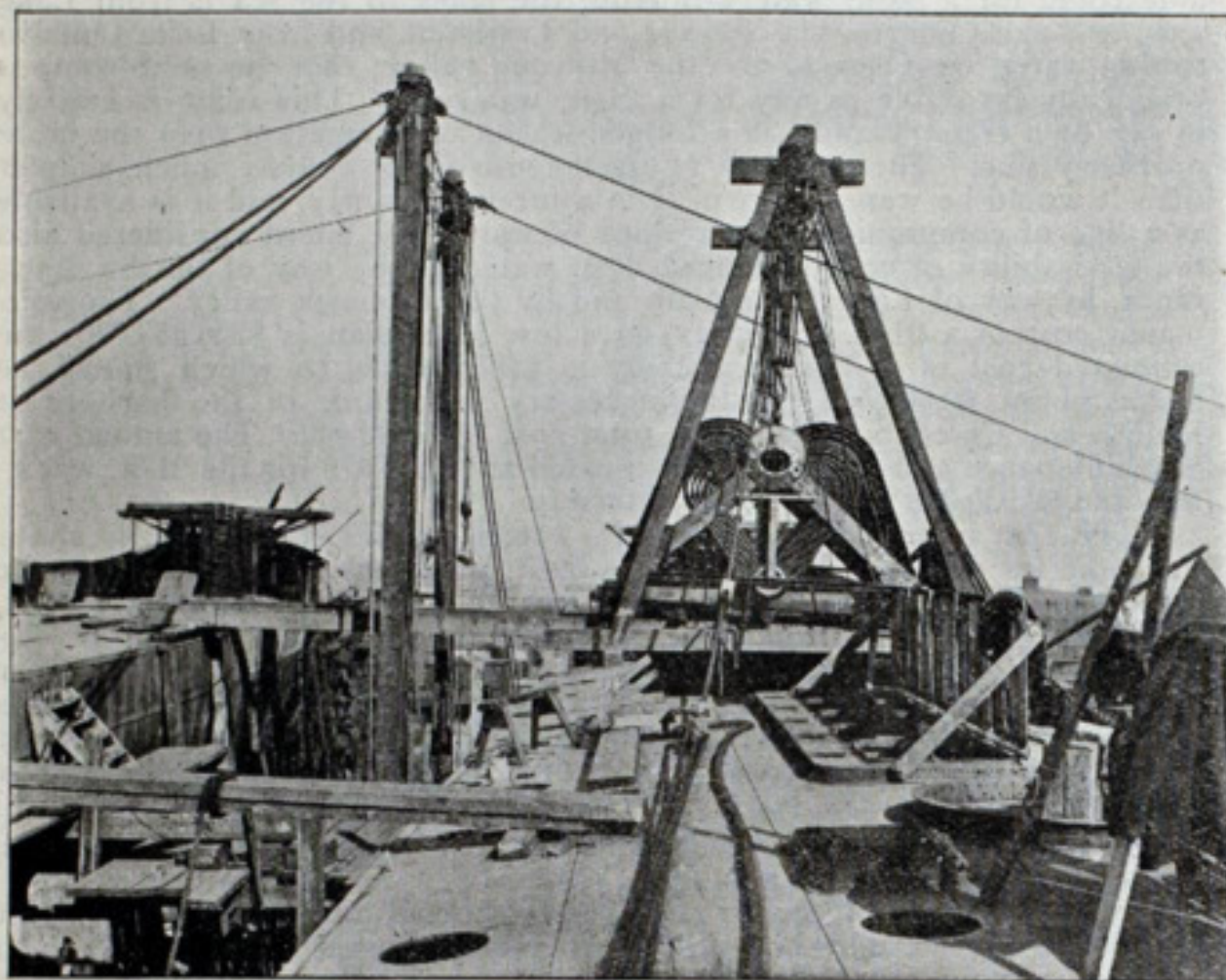
Finally the argument has often been advanced that a deep waterway connecting the lakes with the sea would be of great military value in connection with the defense of the northern frontier of the country. Such a waterway would enable ships of war to pass between the sea and the lakes and would also permit the economical construction of such vessels at the lake ship yards.

It is easily conceivable that a barge canal of mature dimensions, requiring transfers at Buffalo and New York, might be of more direct benefit to the state of New York than to a canal of sufficient dimensions for the uninterrupted passage of ships, but much of this benefit would be at the expense of producers and shippers of other parts of the country. Moreover, with such a canal the large interests of ship building and winter traffic for the lake ship would be unprovided for.

INGENIOUS METHOD OF HANDLING BOILERS.

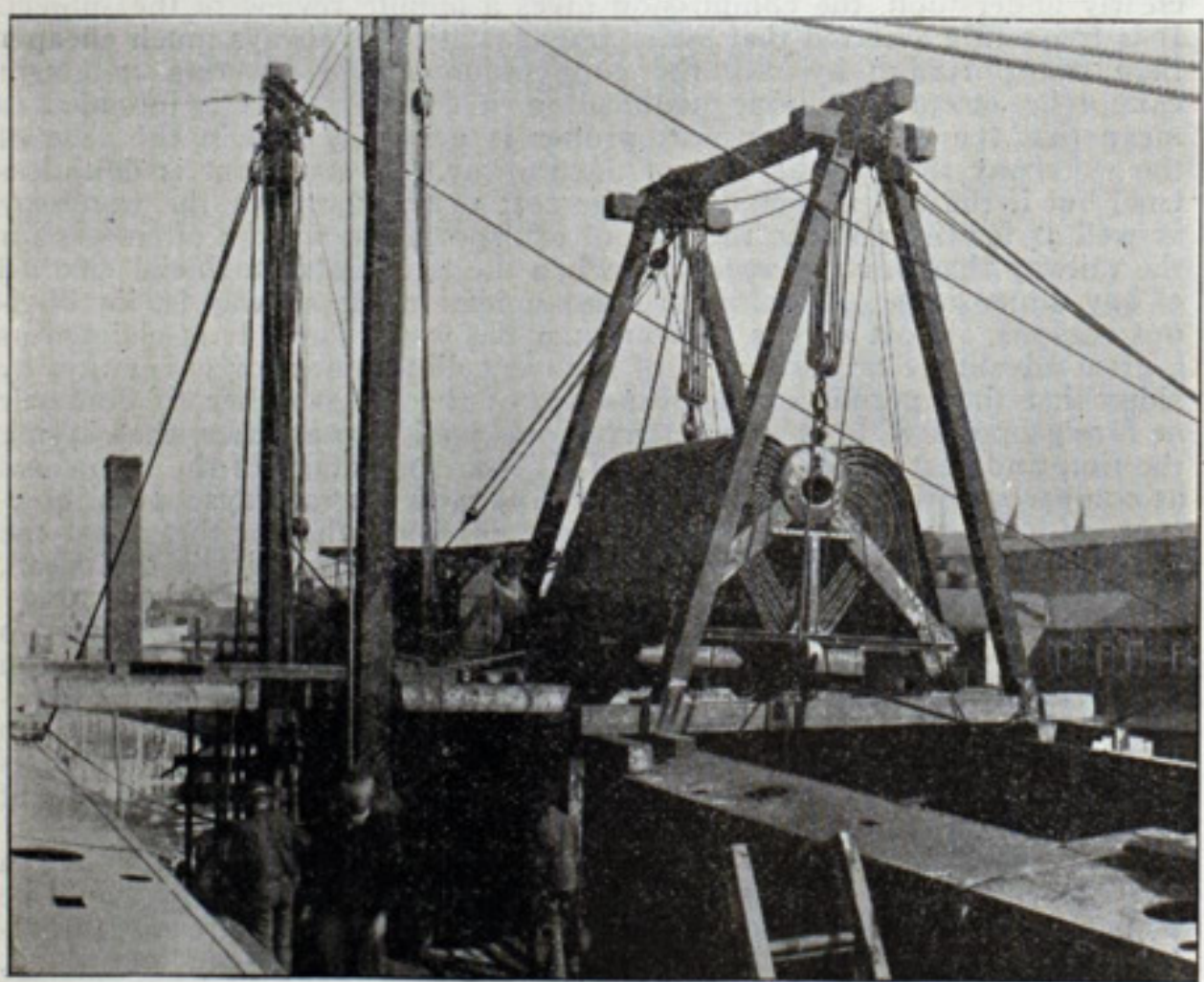
The task of placing the boilers of a vessel on board is at all times a difficult one, and any arrangement or device which may tend to commend itself as a safe one is eagerly sought for and taken up. In the building of the United States torpedo boat destroyers Hopkins and Hull at Wilmington, Del., the Harlan & Hollingsworth Co. were at last confronted with this task. As it was expedient to place the boilers in position while the boats were still on the stocks, the undertaking was necessarily more difficult than if the boats had been in the water and the shear legs could have been used; so they immediately set to work to meet it.

By looking carefully at the accompanying photographs, a good idea of how the job was accomplished can very easily be formed. Possibly a



description may not come amiss, and will, perhaps, show more clearly how the work was done. May be, also, it would suggest accounts of experiences of other builders under similar circumstances.

On each boat a double triangular support was made by lashing two triangles to the fore-and-aft beam at the top. The bases of these triangles rested on the deck directly over the boiler room, extending across the ship, and separated far enough to allow the boilers to be lowered to their proper position. A double set of triple 16-in. blocks is shown at each end of the support. Between the ships are seen two large wooden uprights, 12 in. square. The boilers are rolled along the ground until they are between these two uprights. Then they are hoisted to a set of skids resting on the decks of both vessels and extending all the way across one



and to the deck of the other. The boiler having been placed on rollers, is now moved over to the center of the ship. Here the weight is taken off the skids and to the blocks of the triangular support, and the skids, rollers, etc., removed. Then the boiler is lowered to its place in the ship.

It will be noticed in the photographs, that the boilers are stiffened by heavy cross pieces and tied together by a heavy angle bar. This keeps the boilers plumb and also prevents any strain falling on the lower drums. After this operation is completed, all the gear is moved aft and the same work is again gone through with the other set of boilers.

This ingenious and exceedingly safe arrangement does away with the old style derrick. Had that been used it would have required a long jib and one of great strength. By this method the strain is not so great, as it at all times nearly vertical. The full set of eight boilers of the Thornycroft type, weighing about eight tons each, were safely placed in position in about two weeks.

BIDS FOR THE BATTLESHIP'S AND CRUISERS.

Bids were opened in the office of the secretary of the navy on Friday last for the construction of eleven armorclads of the first class—five battleships and six armored cruisers—representing a cost to the government of about \$35,000,000, exclusive of armor or armament. These ships will comprise in tonnage more than the entire tonnage of the United States navy ten years ago, and the number of vessels concerned is greater than the number of battleships and armored cruisers now in the American service. All the bids submitted were based on the department's plans. The board of construction met on Monday to consider the bids. It will require several days to determine who are the successful bidders owing to the cutting out of specifications by certain of the bidders. Moran Bros. Co., Seattle, Wash., are making a spirited effort to secure one or more of the ships. Mr. Robert Moran, who is at present in Washington, says that few persons in the east appreciate the facilities that have been provided for large ship building operations on Puget Sound. He says that after subtracting the 4 per cent. allowance in favor of Pacific coast builders, his company's bid is lower than any of the eastern builders except John H. Dialogue & Son. The bids follow:

ARMORED CRUISERS, SHEATHED AND COPPERED.

William Cramp & Sons Ship & Engine Building Co., Philadelphia—One vessel authorized by act of March 3, 1899, at \$3,890,000; act of June 7, 1900, one vessel at \$3,780,000.

Newport News Ship Building & Dry Dock Co., Newport News, Va.—One vessel, act of March 3, 1899, \$3,885,000.

Fore River Engine Co., Quincy, Mass.—Act of March 3, 1899, one vessel at \$3,975,000, or two at \$3,950,000 each.

Union Iron Works, San Francisco, Cal.—Act of March 3, 1899, one vessel at \$3,800,000.

Moran Brothers Co., Seattle, Wash.—Act of March 3, 1899, one vessel at \$4,132,000, or two at \$4,008,000 each.

Risden Iron & Locomotive Works of San Francisco, Cal.—Act of June 7, 1900, one vessel at \$4,075,000.

ARMORED CRUISERS, NOT SHEATHED OR COPPERED.

Newport News Ship Building & Dry Dock Co.—Act of March 3, 1899, one vessel at \$3,775,000, or two ships at the same price each.

Fore River Engine Co.—Act of March 3, 1899, one vessel at \$3,800,000, or two at \$3,778,000 each; act of June 7, 1900, one vessel at \$3,800,000, or two at \$3,775,000 each.

Union Iron Works—One vessel at \$3,770,000.

John H. Dialogue & Son, Camden, N. J.—Act of March 3, 1899, one vessel at \$3,825,000; act of June 7, 1900, one vessel at \$3,825,000.

Moran Brothers—Act of March 3, 1899, one vessel at \$3,936,000, or two vessels at \$3,844,000 each; act of June 7, 1900, one vessel at \$3,963,000, or two vessels at \$3,844,000 each.

BATTLESHIPS, UNSHEATHED.

Newport News Co.—Act of March 3, 1899, one vessel at \$3,540,000.

Fore River Co.—Act of March 3, 1899, one vessel at \$3,430,000, or two at \$3,405,000 each; act of June 7, 1900, one vessel at \$3,430,000, or two at \$3,405,000 each.

Union Iron Works—Act of June 7, 1900, one vessel at \$3,460,000, electric plant and coaling appliances to be furnished by government.

Union Iron Works—Act of March 3, 1899, one vessel at \$3,460,000, the government to furnish electric apparatus and coaling appliances.

BATTLESHIPS, SHEATHED AND COPPERED.

Newport News Co.—Act of March 3, 1899, one vessel at \$3,593,000.

Fore River Engine Co.—Act of March 3, 1899, one vessel at \$3,580,000, or two at \$3,555,000 each.

Union Iron Works—Act of March 3, 1899, one vessel at \$3,600,000.

John H. Dialogue & Son—Act of March 3, 1899, one vessel at \$3,400,000.

Moran Brothers—Act of March 3, 1899, one vessel at \$3,865,000, or two vessels at \$3,789,000 each.

John H. Dialogue & Son—One vessel at \$3,290,000.

New York Ship Building Co.—Act of March 3, 1899, one vessel at \$4,100,000, or two at \$4,075,000 each.

Moran Brothers—Act of March 3, 1899, one vessel at \$3,697,000, or two at \$3,586,000; act of June 7, 1900, one vessel at \$3,796,000, or two at \$3,568,000 each.

Bath Iron Works, Bath, Me.—One vessel, \$3,590,000.

The armored cruisers are the West Virginia, Nebraska, California, Maryland, Colorado and South Dakota. The battleships are the Pennsylvania, New Jersey, Georgia, Virginia and Rhode Island. Three of the armored cruisers are to be sheathed and coppered. Each of the six vessels in this class is to have a length of 502 ft. The sheathed ships are to have a displacement of 13,800 tons, and the unsheathed 13,400 tons. Every armored cruiser will be fitted as a flagship and will have accommodations for 822 officers and men. The speed must be at least 22 knots an hour.

The battleships will be the most powerful ever projected. Three of them will have the superposed or double-deck turret now installed only on the Kearsarge and Kentucky, and the same number will be sheathed and coppered. The sheathed vessels will be 435 ft. long and have a displacement of about 15,000 tons. The unsheathed vessels will be of the same length and have a displacement of about 14,600 tons. The contract will call for a speed of at least 19 knots an hour. All five of the battleships will be fitted to carry flag officers, and the complement of each will be 703 officers and men.

The board of construction devoted considerable attention to the bids of the Fore River Engine Co., owing to the fact that they are so low. This company has built gunboats and destroyers but no large vessels of war. Its plant has, however, recently been greatly enlarged until it can now build any manner of warship. The board believes that the Fore River company should have at least one of the battleships, and it is stated at the navy department that it would not be surprising if contracts for four of the warships were given to this new works, owing to the lowness of its bids. The bid of the Moran Bros. Co., Seattle, Wash., is also regarded favorably.

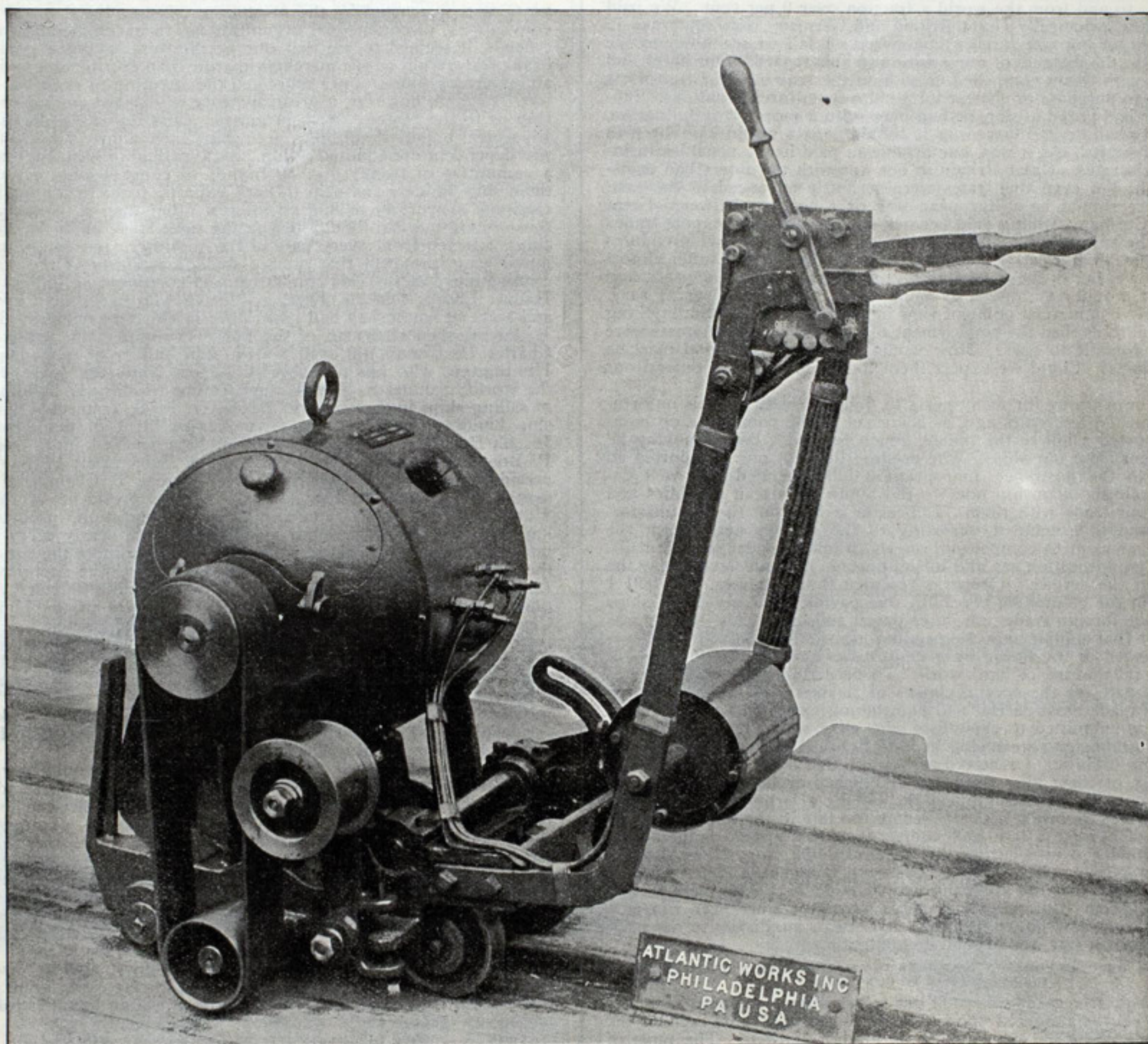
PORTABLE ELECTRIC DECK OR FLOOR PLANING MACHINE.

The illustration on this page represents an electric deck or floor planing machine of the latest and most improved type. They are made in two sizes, to plane 10 in. and 15 in. wide, are driven by an electric motor of 5 H. P. on the 10-in. machine and 7½ H. P. on the 15-in. machine; either motor runs at a speed of 2200 revolutions per minute and is wound for 220 volts direct current. The main frame is of steel. The cutting cylinder is made of forged steel, planed true and slotted for the knife bolts. The knives are so placed on the cylinder that one end of the cutter is in advance of the other, thus making a drawing cut.

The whole machine is mounted on rollers, turned true and fitted in their bearings, with hardened steel rollers, in order to reduce the labor of moving the machine to a minimum. The back set of rollers are arranged so that they may be raised or lowered for more or less cut, and also when drawing the machine backward for starting a new cut, the machine will automatically raise the knives clear of the floor. The machine is easily portable, and as light as is consistent with strength. It is furnished with

SKIPPER OF THE CUP DEFENDER.

Urias Rhodes has been appointed skipper of the America's cup defender. Last year, while it was agreed that Capt. Charles Barr was an able sailor, many did not like his selection as the sailing master of the Columbia because he was born in Scotland. The fact that he had remedied the mischief as much as possible by becoming naturalized made no difference with his critics. Capt. Rhodes is an American. He was born forty-eight years ago, and has been a sailor as long as he can remember. He lives with his family at Bay Shore, L. I. He has served on yachts from the lowest position before the mast. His first experience in a cup race was as a seaman on the Atlantic in 1886, when that sloop sailed against the Puritan and Mayflower in the trials for the honor of defending the trophy against the Galatea. Next he was mate on the Volunteer. After that he had charge of the schooner Sea Fox and then the Montauk. When John E. Brooks had the schooner Lasca built Capt. Rhodes was appointed skipper and he handled that yacht for four years. When J. I. Watson went across the Atlantic in the Lasca Capt. Rhodes was the sailing master



PORTABLE ELECTRIC DECK OR FLOOR PLANING MACHINE.

one set of cutters, one endless belt, electric motor on the machine with starting box and switch complete up to the point of attaching the wire for the current, and two sets of spare brushes. The manufacturers will also furnish, when required, an extra cutter head and knives for planing close up to a wall or partition. The weight of 10-in. machine is 500 lbs.; weight of 15-in. machine, 750 lbs. The manufacturers are the Atlantic Works, Incorporated, Twenty-third and Arch Sts., Philadelphia.

NEW VESSELS FOR PROTECTION OF FISHERIES.

The department of marine and fisheries in Canada is calling for tenders for the construction of two fine cruisers to be used on the Pacific coast for the protection of the fisheries. The steamers will be built in British Columbia. The specifications of one of the steamers call for an elegantly fitted craft, splendidly equipped, with a speed of 12 knots in ordinary weather. She will be 130 ft. long, 24 ft. beam and 10 ft. depth of hold or 11 ft. molded depth. She will be a wooden screw vessel, schooner rigged, with three pole masts. Her hull will be of the best seasoned British Columbia fir, with hardwood finishings in the cabin, and her machinery is to be the finest of the kind required. The specifications of the other cruiser are not complete.

The Sterling White Lead Co., of New Kensington, Pa., have placed the order for their seven buildings with the American Bridge Co.

and navigator. In 1898 Mr. Duncan selected Capt. Rhodes to sail the Defender, and in all that yacht's races against the Columbia she was superbly handled and in some races Capt. Rhodes clearly outgeneralled Capt. Barr on the Columbia. Last season Capt. Rhodes had charge of the schooner Emerald, owned by W. E. Iselin, but that yacht did not take part in any races. Capt. Rhodes is a modest, retiring man. He has hosts of friends and is well liked by the crews he has commanded. He is particularly good at the start of a race. This was shown by the way he handled the Defender, and Capt. Sycamore will have to be a wonder to get the better of him.

Mr. Standbury, assistant chief surveyor of the British Lloyds, with headquarters at London, is at present in New York. The British Lloyds will classify and survey the mammoth vessels building at New London for the Great Northern Steamship Co.; also the 600-ft. Atlantic transport ships building at the works of the Maryland Steel Co. and two smaller vessels contracted for by the New York Ship Building Co. All the vessels now building for the Hawaiian Steam Navigation Co. are also to receive Lloyds highest rating.

The lake-built steamer Paraguay has left the yard of the Eastern Ship Building Co. where she was fitted out for Atlantic tramping and is now engaged in general coast trade. The Asuncion, a sister ship, has arrived at New London and is being fitted out for deep-sea work.

SENATOR FRYE'S SPEECH.

A THOROUGH KNOWLEDGE OF THE SUBJECT OF COMMERCIAL DEVELOPMENT AND THE CONSTRUCTION AND OPERATION OF SHIPS IS SHOWN IN THE PRESENTATION OF THE SHIPPING BILL TO THE SENATE.

In presenting to the senate of the United States, a few days ago, the measure of greatest interest in the present congress—the shipping bill—Hon. Wm. P. Frye of Maine said:

"Our present condition as a great maritime nation is humiliating beyond expression. With thousands of miles of seacoast equipped with fine harbors, boundless forests, iron and coal enough to supply the world, skilled mechanics, enterprising ship builders, the largest exportations of any country in the world, imports amounting last year to \$840,000,000, and abundant capital, we have permitted other countries—our commercial rivals, our inferiors in most of these regards—to seize upon the pathways of the oceans and hold them to our practical exclusion. Last year we carried under our flag to and from Europe only 2½ per cent. of our exports and imports; to and from the world a fraction over 9 per cent. We paid foreign nations, principally Great Britain and Germany, \$500,000 a day in gold for transporting our foreign commerce. I fail to see how anyone can be blind to the dangers of our position in this regard. Our short and decisive war with Spain compelled us to hunt the seas over for transports and colliers; to purchase or charter forty ships from foreign nations. Suppose the war had lasted a year, or had been with a more powerful nation, and neutrality had been enforced, as it should be, we would have been in most serious straits. As it was, our producers paid heavy penalties in increased freight rates. Great Britain in her war with the Boers had transports enough; but even then rates were seriously advanced in the east. Suppose there should be a European war or a conflict between Great Britain and Germany, what would become of our enormous export trade? Who would be our carriers? Who would pay the war insurance premiums on our cargoes, even if carriers could be found? We should suffer almost as seriously as either of the combatants. Our farmers, manufacturers, and wage-earners would pay almost as much as a cost of the war as they. From a purely commercial point of view in peaceful hours could anything be less helpful to us than the employment of agencies whose interests were entirely antagonistic to ours? How would they help us to find markets for our products? Could we expect them to be ambitious to extend our foreign trade?"

"I have been trying for many years to find a remedy for this unfortunate condition. A few years ago, as chairman of the committee on commerce, I reported a bill to the senate, which became a law, removing all statute burdens from our ships. The decline still kept on. I reported an amendment to the postoffice appropriation bill, intended and well designed to establish steamship lines to the South American republics and to promote our trade with them. It became a law, but the postmaster-general refused to execute it, resorting to the statutes authorizing the postoffice department to compel our vessels to take and deliver the mails, receiving as compensation sea and inland postage not sufficient to pay the actual cost of the service. Congress repealed those statutes. In 1891 I reported from the committee two bills, one paying a bounty to all ships engaged in the foreign trade, the other postal subsidies. The bounty was nearly double that contained in the pending measure. It passed the senate and was defeated in the house by a majority of three. The subsidy bill cost me several months of hard work. To be certain of providing rates just and adequate for the several classes of steamers I consulted leading experts, who made most careful and painstaking examination. The completed bill was submitted to capitalists who were willing to consider the propriety of establishing steamship lines to South America, in the Pacific and across the Atlantic. I received assurances that if the bill was enacted into a law six or eight lines would be established of ships from 14 to 21 knots an hour. The house crippled the bill by a large and unscientific reduction of rates, returned it to the senate too late in the session for any contest, and it became a law. Of course, it proved a dead failure. We did succeed under it in securing the American line from New York to Southampton by admitting the New York and Paris to an American registry on condition that the company should build two ships here of like tonnage and speed. But those four ships have ever since been run at a loss to the corporation, not to us, for their value as auxiliaries to our navy during the Spanish war was beyond computation.

EXTENSION OF OUR FOREIGN MARKETS IS AN ABSOLUTE NECESSITY, IF PROSPERITY IS TO CONTINUE.

"Now, in these regards we are at our worst when we should be at our best. The world has entered upon a fierce commercial war, each of the great powers seeking an extension of its foreign markets. The most of them are already intrenched in all of the commercial ports of the world, with subsidized steamship lines, banking facilities, long-established business agencies. They are all, too, looking especially to the east for the desired extension; Russia, England, Germany, France and Italy are paying \$5,000,000 in aid of steamship lines to Asia, while we are paying \$48,000; and yet our necessities are as pressing, if not more so, than theirs. Our productive forces are greater than those of any other country. We raise more wheat, ten times more corn, five times more cotton, produce more coal, more pig iron, more copper, have cheaper freight rates on rail, by river and lake, than any country in the world. Our product from farm, factory, shop, and mine is increasing enormously. During the last three years we have exported \$500,000,000 worth more of farm products than during the preceding three years. Our manufactures are showing a corresponding increase. In 1897 we exported \$151,000,000 and imported twice more than we exported. Last year we exported \$200,000,000 more than we imported. This increase will continue, and to us an extension of our foreign markets is an absolute necessity if prosperity is to continue, for an unsold surplus would prove its death knell. In some regards there is no nation better equipped to secure its share of the trade of the Pacific than ours. With our Pacific coasts, Hawaii and Pearl harbor, the best in the Pacific; Tutuila, with the second best harbor, a coaling and naval station already completely equipped there; Guam, a coaling station and a landing place for our cable, and I sincerely hope that the cable will be provided for at this session; the Philippine Archipelago, with Manila for a distributing point for our products, we lack but one thing—ships to carry our exports. This is a serious handicap. One of the most efficient possible agencies for the extension of our markets would be American ships, officered by intelligent, active and interested American citizens; seeking

markets for our goods, establishing abroad all the necessary agencies for trade.

"Why do we find ourselves in this unfortunate and humiliating condition as to our foreign carrying trade? In my opinion there can be but one answer. Our ships costing 25 per cent. more than those of England and Germany, with operating charges at least 40 per cent. greater by reason of higher wages and better living, unprotected, are compelled to compete with those protected. We outstrip other nations in nearly all of the industries by law encouraged and protected. This one alone, more important than any other, because national, is left to fight the battle with the world unaided. We have today a most magnificent fleet of coastwise river and lake vessels, with a tonnage of documented and undocumented close on to six millions. It carried last year 168,000,000 tons of freight and 200,000,000 passengers at lower rates than elsewhere known. This industry has been protected for a hundred years by a law prohibiting any foreign ship from engaging in it.

HOW AND BY WHOM THE BILL WAS PREPARED.

"This brings me to the consideration of the pending measure. Three years ago, instructed by the resolutions of state legislatures, of political conventions, of commercial organizations, by recommendations of public officials, it seemed to me that our people were taking a greater interest in the restoration of our merchant marine than ever before, and that it was an opportune time to once more call the attention of congress to the subject. I found, however, a great diversity of opinion among friends of the ship as to the remedy to be proposed. Discriminating duties had many advocates; bounties, subsidies, free ships each some. I knew that success was dependent upon united action. As a method of securing that I selected a committee of twenty-five, all friends of congressional action; some of them ship builders and ship owners, experts, required for intelligent conclusions; a majority having no interest other than as American citizens; those interested, hardly any two in the same trade or in the same type of ships, selected from every part of the country; some favoring each proposed remedy except that of free ships, a majority at the start for discriminating duties. This committee was composed as follows: Senators Hanna, Elkins, Perkins, Frye, gentlemen who had shown great interest, and some of whom had had experience in shipping matters; Hon. Serego E. Payne, then chairman of the house committee on merchant marine; Charles H. Cramp, the well known ship builder of Philadelphia; C. P. Huntington, who has probably at Newport News the finest ship yard in the world; Samuel S. Sewall, representing the largest building company of sailing ships in the country; Edwin W. Hyde, connected with the Bath ship building works; C. A. Griscom, president of the American line; Joseph P. Grace, representing the line between New York and Chile; H. P. Booth, president of the New York & Cuba Mail; William P. Clyde, president of the Clyde Steamship Co.; Eugene T. Chamberlain, commissioner of navigation; Theodore C. Search, president of the National Manufacturers' Association, the largest association, probably, that is known in the world, having a membership from nearly every state in the union, an association whose sole object is to promote the export trade of the United States; Aaron Vanderbilt, secretary of the American Shipping League; Harvey D. Goulder, attorney for the Lake Carriers' Association, one of the most accomplished admiralty lawyers in the United States; Charles H. Keep, secretary of the Lake Carriers' Association, which represents nine-tenths of the lake interests; D. D. C. Mink, president of the Coastwise Steamship Association, having no interest in this subject except as an American citizen and understanding shipping interests; A. R. Smith, formerly editor of the Seaboard, now secretary of the New York Commission of Commerce; Frank J. Firth, president of the Lake Carriers' Association, and Thomas Clyde, of the Clyde Steamship Co. The subject-matter was committed to this committee in 1897.

"Leaving out myself, Mr. President, I think it would be very difficult to select from the entire country men more capable of just and intelligent conclusions. It was possibly unfortunate for the American line that Mr. Griscom, its president, was made chairman. To escape even the seeming of selfish purpose for his own, he assented to terms which gave that line the lowest subsidy. Knowing that the subject to be considered would involve many important legal questions, I advised the employment of counsel. Hon. George F. Edmunds was very wisely selected. The committee was indefatigable in its labors, meeting many times in New York, Philadelphia, and Washington. After full, complete, and the most careful consideration this committee finally, with entire unanimity, decided against discriminating duties, against discriminating tonnage taxes, against bounties to be paid on the exportation of the products of the American farm, and in favor of sailing bounties for our ships, and in my opinion these conclusions were eminently wise.

WHY DISCRIMINATING DUTIES WERE DISCARDED.

"I am aware that in the early days when we carried but little of our commerce we adopted discriminating duties and that our carrying trade increased. I am equally aware that we surrendered the discriminating duties. The conditions prevailing then do not prevail at all today. Then we were not an exporting nation. Then we imported the most of what we used in the country. Then other countries discriminated and could not complain of our doing so. Then we had no commercial treaties with other nations; and then, again, no man could tell whether or not it was the discriminating duties which increased our carrying trade. We had at the same time a prohibitory tonnage tax against certain classes of ships—absolutely prohibitory. How much did that have to do with our getting our carrying trade back? Again, in those days we built the cheapest ships built in the world. We even built ships for other nations. Then, again, there was not the difference in wages in those days nor in the manner of living on shipboard there is today. Suppose you pass a law providing for discriminating duties of 10, 15, or 20 per cent.; who knows but that the next congress would repeal it? With the danger of such repeal, do you suppose you are going to induce any capital to build these ships, costing all the way from a million to two million dollars apiece. Take our position today. See where we would be under discriminating duties. Of course no duty can be laid on exports, and we must deal with imports alone. Our imports last year amounted to \$840,000,000. Thirty-five per cent. of those were raw materials for our manufacturers. Is it likely that congress would impose a duty on those raw materials? Is it likely that the country would receive that with favor? Again, 44 per cent. of all those imports are on the free list, placed there by congress for good and undoubtedly sufficient reasons. Would congress, then, turn around and impose a duty of 10 or 15 per cent. on the entire free list? Certainly it would

not. Then it leaves us with three or four hundred million dollars in imports and a discriminating duty to establish our merchant marine once more upon the oceans of the world. It is simply an utterly absurd proposition. It would not be a bagatelle in solving the problem.

"Take the matter of bounties on exports. Can you place a bounty on wheat? I do not think the constitution would permit it. Can you select certain products of the farm and place bounties upon them? I am inclined to think that the lawyers here would say "no." But there are twenty or thirty treaties which would be violated by such a course, and you would be compelled to abrogate all of them. Again, you would be compelled to pay those bounties to all ships, and you would simply leave us in the same relative position that we are today. Then again, who would receive the bounties? The ship, to be sure. You could not hunt up the farmers all over this country and pay them the bounty. They had counsel and he proposed a dollar a ton placed on agricultural products. But the tonnage of such products would amount, I think, to between 20,000,000 and 29,000,000 tons. That would require an expenditure of from \$20,000,000 to \$29,000,000 every year; and the expenditure would be to the ships, never to the farmer. He would not get the slightest possible benefit from it, while under the measure which is pending I have no doubt that the farmers of this country will receive an immense benefit. You let this bill become a law, and commence building our ships, do you suppose that Germany and Great Britain are going to surrender without a contest the profits that they have been receiving from our carrying trade? It will be one of the sharpest we have ever seen on the oceans. Every witness before our committee and before the house committee declared that in his judgment it would reduce the freight rates for transportation across the oceans at least 25 per cent. within two years.

"What is the tonnage of our exports and imports? About 30,000,000 tons, as to our exports. Perhaps exports and imports both might amount to in the neighborhood of 40,000,000 tons. What is the average rate across the oceans of the world? It is nearer \$6 than \$5, but call it \$5, and then you have \$200,000,000 paid for freight on your exports and your imports. Suppose these gentlemen are right and that the competition will reduce freight rates 25 per cent. Then you have a saving of \$50,000,000 a year in rates. Who saves that? Not the ship owner. He loses it. It is the producer who saves it. In that way the farmer, the producer, receives a direct benefit. In the other way of bounty it is utterly impossible for him to get any benefit. I wish to say right here what I should have said before, that in the matter of discriminating duties we encountered thirty-one commercial treaties, every one of which we should be compelled to abrogate. Some of them you can abrogate, on notice, in a year, some of them in two years. Those treaties are reasonably satisfactory to the people of the United States. Suppose that after we had placed discriminating duties upon the imports sent into this country we should desire once more to place ourselves in accord with the commercial nations of the earth. Do you think we could easily renew our treaties, when we had given this direct offense to all these nations of abrogation and then the discriminating

duties? Our relations with the people of Europe today are of the very best, and our exports to them today are enormous, especially to Great Britain. Is it wise to do anything which shall disturb the present amicable commercial relations between us and those countries?

"I assert, and I assert it without the slightest hesitation, that you can admit free ships to the United States today, and you will find no capital to invest in them. You will not be able to sail them on the oceans of the world in competition with the Norwegian ships or the English.

"A bill was finally drafted embodying the views of this committee, was presented to the senate in the last congress by Senator Hanna, and to the house by Representative Payne, referred to the respective committees having jurisdiction, was carefully considered, evidence taken, discussion had, amendments adopted and favorable reports were made; but for want of time the measure was not considered. The general committee agreed to the amendments proposed by the congressional committee; the press gave the details of the bill to the country. The result was further criticisms, additional amendments. All were considered, and those seeming reasonable were adopted. At the last session of this congress the amended bills were again referred, were again discussed in committee, additional amendments were adopted, and agreed to by a subcommittee of the general committee, which was continually in session here. Finally the pending measure, with proposed amendments, was favorably reported to the senate by the chairman of the committee on commerce. In regard to it I wish to say that there never was any other bill before congress which received such a close and critical consideration, on which was expended such careful, conscientious and intelligent work. Nor was there ever one with this purpose in view which so generally commended itself to the friends of the American ship. Its critics and opponents are those who honestly believe in, and have always advocated, free ships, and the foreign lines who will not tamely submit to surrender the profits of their carrying trade. The former contest it from principle, but are not dangerous, for the country rejects their theory; the latter are inspired only by self-interest, one of the most powerful of all motives, and they will make a most determined, vigorous, and never-ending fight."

Following this general statement regarding the bill, Senator Frye spent the greater part of two days in the senate going into the question of cost of construction and operation of ships under the American flag. No ship builder or ship owner is better posted than Mr. Frye along these lines. He was fortified by statements as to the actual cost of ships built in this country and in England. Names of the vessels were given in a number of cases. He presented tables and official statements giving wages, costs of food and other items entering into operating expenses. He also discussed at some length the subsidies of foreign lines, and finally took up the bill section by section, explaining different features of the bill as it applies to different classes of ships.

The Cleveland Pneumatic Tool Co. of Cleveland has increased its capital from \$25,000 to \$75,000.

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Recognized by the

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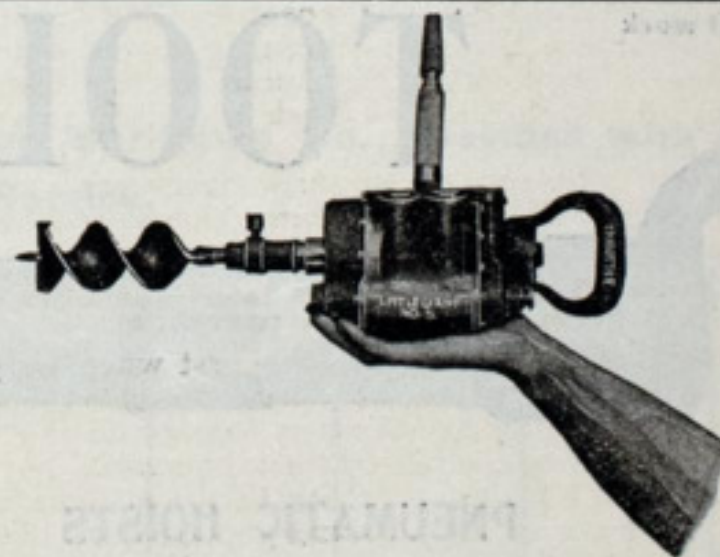


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The "Little Giant" Reversible Boring Machine No. 5

Especially Designed for Shipyard and Dock Work. Will Bore up to 4" in Diameter in any kind of wood. Piston type. Weight, 14 lbs. Very Powerful. Will perform the work of five men. In use in all the U. S. Navy Yards and Large Shipyards.

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FROM THE WORKS OF NEAFIE & LEVY, PHILADELPHIA.

Philadelphia, Pa., Dec. 12.—The Neafie & Levy Ship & Engine Building Co. of this city have a full share of new work under way and orders to follow that will keep them busy for a long time to come. The three torpedo boats, Bainbridge, Barry and Chauncey, are nearing completion and the cruiser Denver is fairly well under way. Among merchant ships is a large freight and passenger steamer for the Red D line of New York. The company also has contracts for the construction of two freight and passenger steamers for Delaware river service. These vessels are each to be of 162 ft. length, 33 ft. beam and 8 ft. 3 in. depth. They will have twin screws, and the triple expansion engines—two in each ship—will have cylinders of 10, 15 and 23 in. diameter and 18 in. stroke. Boilers of locomotive type, two in each steamer, will be 5½ ft. diameter and 20 ft. long. Another order is for a pilot boat for the pilots of Galveston, Tex. This vessel will be 112 ft. long, 23 ft. beam and 13 ft. depth and will be propelled by compound engines of 16 and 32 in. cylinder diameters and 24 in. stroke, supplied with steam from a boiler of 12 ft. diameter and 11 ft. length. On the list of new steel vessels also is a seagoing tug for the South Atlantic Towing Co. of Brunswick, Ga. Dimensions and other leading particulars of this vessel are: Length, 120 ft.; beam, 22½ ft.; depth, 12½ ft.; triple expansion engine with cylinders of 14, 21 and 26 in. diameter and 26 in. stroke; boiler, 13 ft. diameter and 12 ft. long. A wooden hull tug boat is also under order. The vessel will be 110 ft. long, 23 ft. 8½ in. beam and 10 ft. 6 in. depth. Engines will be compound, 18 and 36 by 26 in., and the boiler will be of 13 ft. diameter and 12 ft. length. Orders for a triple expansion engine and a compound engine and for three boilers are also on the company's books.

Neafie & Levy recently delivered to the City of Philadelphia the fire and police boat Samuel H. Ashbridge, which is considered the finest boat of its kind in the United States. This vessel is intended for harbor service, but on the trial trip it was taken out to sea and experienced very heavy weather at the Delaware breakwater without injury of any kind.

In an account of a lecture by John P. Holland, inventor of the Holland submarine boat, given before students of Manhattan college, the New York papers report Mr. Holland as saying: "Besides its utility in defense and attack, the submarine boat is fitted for passenger traffic. For trans-oceanic travel, however, it would be a commercial failure, but for short passages it would be invaluable. The nasty seas that run between Dover and Calais or between Holyhead and Dublin would no longer be the bugbear of tourists, for the boat would keep steadily on its way unaffected by the storms and waves that rage at the surface."

PASSING OF THE CARVER.

In these practical days the man who builds a vessel seldom spends much money in useless decoration of the craft, and so it is that the crowning glory of the ship of olden time—the figurehead—is now seldom seen on American vessels, except on the larger yachts. With the passing of the figurehead has disappeared almost entirely the once flourishing industry, or art, of the ship carver. Up to twenty years ago nearly all vessels of any size carried some sort of a carving under their bowsprits. Figures of women of voluptuous form were the favorite, although eagles, fishes, Indians and representations of Triton and Neptune were also much in vogue, while fierce-looking dragons were prime favorites.

Occasionally a refreshing departure was made. For instance, in 1877 there came to Bangor a handsome ship, the Belle of Bath, to load deals for her maiden trip across the Atlantic. The beauty of her lines did not attract half so much attention, however, as did her figurehead, which was the most stunning thing of the kind ever seen in the port.

It was about that time that the "pullback" dress, so-called, came into fashion, and the Belle of Bath carried at her bow the figure of a stylish young lady clad in one of these gowns, all white and gold.

The bark Ocean Belle, also a new vessel, lay in the same dock at High Head, and she had a handsome young woman carved in white pine gracefully poised under her bowsprit. Both vessels were lost when they were new, and the finest figureheads ever carved in Maine went down with them.

A little tug boat in Bangor harbor used to carry a full-sized figure of a Tarratine chief, for which tribe she was named.

The steamboats of olden days down east carried on their paddle boxes elaborate carvings, representing commerce, industry and the states whence they hailed. The lost Cambridge had on her sides the coat-of-arms of Massachusetts, with the state's motto; the Katahdin bore a carved representation of the mountain of that name, with a golden deer skipping over the hills and an Indian paddling across a silver lake, and the Penobscot was ornamented with the head of an Indian chief, gorgeous with feathers. It used to be the fashion to mount golden roosters on the pilot houses of tug boats, but these have long since disappeared. The typical American vessel of today, the four-masted or five-masted schooner, has simply a short bilthead forward, and on the stern her name in big, plain letters. Sometimes the name is circled with a gold cable, but not often.—Boston Transcript.

The governor of Georgia has issued a call for a national maritime congress to assemble at Brunswick, Ga., on Jan. 30, 1901. The number of delegates are limited to two from each chamber of commerce and one from each ship building firm.

Paris Exposition, 1900, confers Highest Award and 2 Gold Medals

(Only Gold Medals in this Class.)

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for Chipping
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RIVETERS

for Shipyard use
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DRILLS

for Railroads
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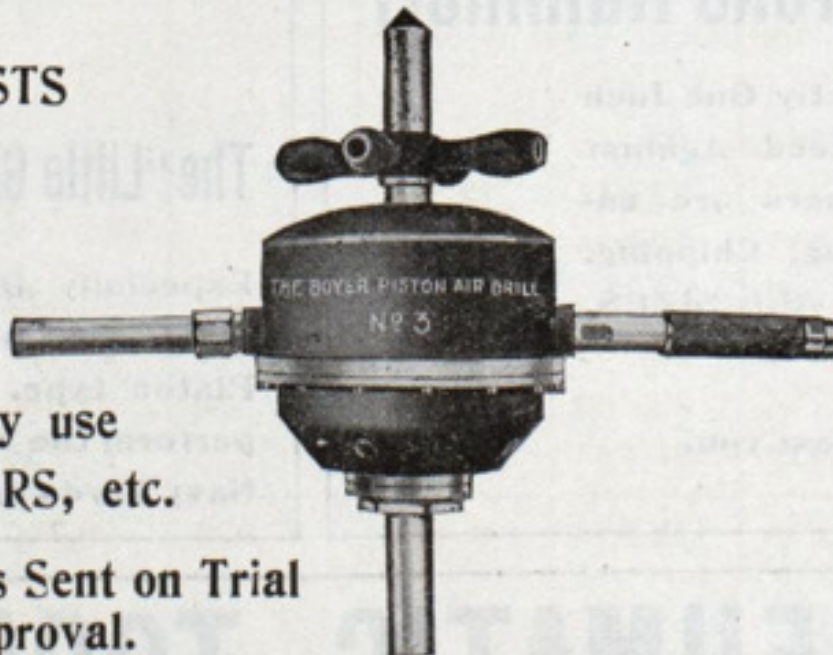
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Subject to Approval.

By actual statistics 95% of all
Pneumatic Tools sold all over
the world are our tools.

UNITED STATES COMMISSION
TO THE
PARIS EXPOSITION OF 1900

PARIS 20 AVENUE RAPP CHICAGO AUDITORIUM BUILDING NEW YORK
EQUITABLE BUILDING
PARIS OFFICES,

August 21, 1900.

Chicago Pneumatic Tool Company,
Chicago.

Gentlemen:

Officially I desire to inform you
that your pneumatic tools received at the
hands of the International Jury of Award, a
Gold medal. Also that Mr. Boyer was awarded
a Gold Medal as collaborator and inventor of
the tools.

Yours very truly,

J. E. Drake
Director of Machinery & Electricity.

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No. 9 York Street, Glasgow. SCHUCHARDT & SCHUTTE, Spandauer-Strasse 59-61, Berlin, Germany; Brussels, Belgium; St. Petersburg, Russia; Vienna,
Austria; Stockholm, Sweden. H. GLAENZER & PERREAUD, 1 Avenue De La Republique, Paris, France and Spain. H. W. PEABODY & Co., Sydney,
New South Wales.

WATER TUBE BOILERS.

Mr. B. H. Thwaite, an English engineer, has been writing in the Engineering Magazine of "Water Tube Steam Generators for Naval Service." First Mr. Thwaite considered the comparative merits and disadvantages of the shell and water tube type of steam generator, and their respective adaptability to the requirements of naval service. In the December issue of the magazine referred to, he describes the best known of the water tube boilers, putting the Belleville, Babcock & Wilcox and Niclausse in the lead. Of Mr. Belleville, the French inventor, he says:

"Anyone who has had to perform the difficult work of pioneering a new engineering departure—and especially a marine one—will realize in some measure the debt that progressive engineers owe to Mr. Belleville. To him is due the honor of having brought the large water tube boiler into the field of marine use. The departure from the beaten track he indicated has been followed by far-reaching results, and his invention has been expanded in a remarkable manner, not only by the French marine but in foreign ones also. It may be also mentioned as a coincidence in favor of the progressive character of French practical science that we owe the remarkable innovation, the small water tube boiler, to a French officer, Commandant Du Temple. All other designs of the small-tube type are based more or less on Du Temple's invention."

The following table, Mr. Thwaite says, approximately represents the application of the Belleville boiler in terms of indicated horse power: France, built, 230,000, building, 145,300; Russia, built, 61,000, building, 197,000; Italy, building, 46,000; Germany, built, 10,000; Austria, built, 34,000, building, 24,000; Japan, built, 36,000, building, 90,000. In the list forty-four vessels are included of considerably over 10,000 I.H.P. each. The indicated horse power supplied to the British navy probably exceeds 150,000. It is stated that forty-one millions sterling are embarked in British warships, already or in the course of being equipped with Belleville boilers.

HEATING AND VENTILATING APPARATUS.

Among the orders recently received by the Buffalo Forge Co., through its Chicago branch, 22-24 W. Randolph street, Chicago, is one from the Quay-Daykin Co. of Chicago for the heating and ventilating of the Sloan building, the plant to consist of a 120-in. fan, driven by a direct connected vertical engine, together with six sections of the Buffalo fan system heater and other accessories, and as cleaning screens, piping, dampers and the like. Another contract from the same source with the Goodman Mfg. Co. of Chicago for heating and ventilating their machine shop calls for a 120-in. fan, direct connected to a Buffalo single vertical engine, together with heater, etc.; and still a third order is from the Centerville Iron Works of Centerville, Iowa, for placing a heating and ventilating plant in the Centerville high school.

The torpedo boat McDonough will be launched from the works of the Fore River Engine Co., East Baintree, Mass. (old yards) on Dec. 22.

SHIP YARD NOTES.

Mr. John J. Hill, formerly of Marine City, and who has decided to engage in the ship building business at Tacoma, Wash., writes the Review as follows: "I have leased from the St. Paul & Tacoma Lumber Co. for a term of years, grounds located on the Puyallup waterway, with a frontage of 600 ft. and a depth of 200 ft. The plant will be for wooden ship building. The gig mill will be 37 by 80 ft. with a mold loft overhead; boiler and engine room 22 by 38 ft.; blacksmith and iron shop in one building, 20 by 46 ft.; tool shop, oakum shop and yard tools in one building, 20 by 47 ft.; office and drafting room, 20 by 30 ft. The works when finished will comprise a complete outfit for wooden ship building. I have brought the Morley & Hill plant from Marine City. Will be ready for business in about six weeks."

A large, four-masted steel ship, the Astral, built for the Standard Oil Co., was launched from the Arthur Sewall Co.'s yards, Bath, Me., last Friday. The Astral will be the first of the Standard Oil Co.'s sailing ships to fly the American flag. She will ply between New York, Japan and China.

If you contemplate a trip either west or east you can secure advantages not found elsewhere if you will write, wire, 'phone or call at the city office of the Nickel Plate road, 189 Superior street, 'phone main 218, or ticket agents Euclid avenue station, 'phone Doan 817. Rates and tickets, first or second-class, to any point authorized east or west at any station on the Nickel Plate road.

245, Dec. 31

THE FLUSHOMETER

THE KENNEY SYSTEM.

[Patented.]

FOR FLUSHING WATER-CLOSETS.

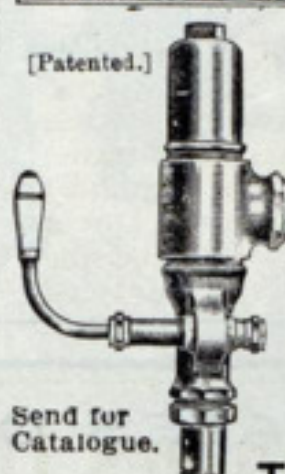
The best system ever invented for use on steam vessels.
No Cup Leathers or Springs.

Owners and Constructors of Steamships, Yachts and Steamboats have found it indispensable.

Used by the U. S. War and Navy Departments—
Transports Grant, Sheridan, Burnside, Terry, Logan, Hooker, Thomas, Sherman and others. Also Albany Day Line Steamers, Norfolk & Washington S. S. Line, Steam Yachts Neaira, Aphrodite and Loando, and new Lake Steamers Illinois, Pennsylvania, Angeline, etc.

Showing application of Flushometer.

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TRADE MARK

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BELLEVILLE GENERATORS

Grand Prix 1889
Originated 1849

Hors Concours 1900
Latest Improvements 1896

Number of Marine Leagues made each year by Steamships of the Messageries Maritimes Co., Provided with Belleville Generators—Since their Adoption in the Service.

Year.	Australian	Polynisien	Armand Behic	Ville de la Ciotat	Ernest Simons	Chili	Cordillere	Laos	Indus	Tonkin	Annam
1890.....	22,576	820									
1891.....	22,749	22,777	68								
1892.....	22,749	22,801	23,274	7,753							
1893.....	22,793	22,781	22,762	22,749							
1894.....	22,813	22,789	22,858	22,813	12,567						
1895.....	22,891	22,922	22,913	22,936	13,629	9,571					
1896.....	23,178	30,906	23,232	23,183	20,735	21,051	13,572				
1897.....	22,750	23,202	30,912	23,185	20,745	25,370	21,119	14,382			
1898.....	23,646	23,178	23,184	23,199	20,842	21,080	21,080	20,851	21,318	7,569	
1899.....	23,178	23,205	22,477	30,135	20,082	20,926	20,956	17,448	18,285	14,669	7,628
Total.....	229,323	215,381	191,680	175,953	108,600	97,998	76,727	52,681	39,603	22,238	7,628

ATELIERS ET CHANTIERS DE L'ERMITAGE, À ST. DENIS (SEINE), FRANCE.
WORKS AND YARDS OF L'ERMITAGE, ST. DENIS (SEINE), FRANCE.

TELEGRAPHIC ADDRESS: BELLEVILLE, SAINT DENIS, SUR SEINE.

TRADE NOTES.

The American Bridge Co. is fabricating at its Gillette-Herzog branch at Minneapolis the structural steel for the Webster county court house at Fort Dodge, Ia.

M. R. Muckle, Jr. & Co., the Philadelphia representatives of Westinghouse, Church, Kerr & Co., have removed to their new office, No. 512 Stephen Girard building, Philadelphia. All communications or papers intended for them should be forwarded to the new address.

The American Wood Fire-Proofing Co., Bowling Green building, New York, announce the official acceptance of their fire-proof wood by the United States navy. A special board was appointed by the secretary of the navy, composed of Asst. Sec. Hackett and Constructors F. T. Bowles and Wm. J. Baxter, who on Nov. 24 reported favorably regarding the acceptance of the American company's product for all naval work. The report has been indorsed by the secretary of the navy. The Underwriters' Bureau of Fire Protection Engineering tested woods of this company, and their report has been accepted by the Rate Bureau in New York city, which makes a reduction of 5 per cent. in rates when fire-proof wood is used in construction.

Thomas Drein & Son, Wilmington, Del., have orders from the American Ship Building Co. (consolidated lake yards) for metallic life boats for all the steamers and tow barges building at the several works of the company around the lakes. Some fifty-eight 22-ft. life boats are included in the order. Four 22-ft. boats have just been shipped from the Wilmington works to the American company's Globe yard at Cleveland. Drein & Son's eastern orders are also larger and more numerous than ever before. They furnished this month twenty-four 26-ft. metallic boats and eighteen sea life rafts for the last of the large Spreckles ships, which is about completed at the works of the Cramps, Philadelphia, and which is to run from San Francisco to Australia.

U. S. Engineer Office, Detroit, Mich., Dec. 1, 1900. Sealed proposals will be received here until 12 o'clock noon, standard time, Jan. 3, 1901, and then publicly opened, for furnishing material and labor of all kinds necessary to construct and put in operation one large steel-hulled, self-propelling, sea-going hydraulic dredge, with all necessary appliances complete, including electric light plant, distilling and refrigerating machinery; or the dredge without outfit. Bidders to state time of delivery. Information furnished on application. Thos. H. Handbury, Major, Eng'rs. Dec. 27.

TURRET STEAMERS FOR THE LAKES.

William Petersen, head of the Newcastle-on-Tyne shipping firm of Petersen, Tate & Co., is in Montreal on his annual business trip, and will proceed to Ottawa and Toronto. A Montreal dispatch says that it is seven years now since his firm entered the St. Lawrence river trade and Mr. Petersen still believes in the route, although he declared that the question of high insurance was of importance in this connection. Mr. Petersen's firm has a large number of vessels of the turret kind, which were first built when the whalebacks came into service on the lakes. He says:

"We contemplate sending a few of our turret steamers up the lakes next season to be engaged in general trade. They will be the largest carriers in existence of canal dimensions. They carry 3,250 gross tons, dead weight, on 18 ft. draught, and 2,000 gross tons on 14 ft. draught, fresh water, or equal to 75,000 bushels of wheat. These boats steam about 13 miles an hour."

Mr. Petersen obtained a franchise from the Dominion government a few years ago for a fast Atlantic line, but was unable to float a company. He says he has lost enough time and money over the matter, but believes the line is necessary, and the Canadian Pacific people are the proper parties to supply it.

VALUE OF STOCKS—LEADING IRON AND STEEL INDUSTRIALS.

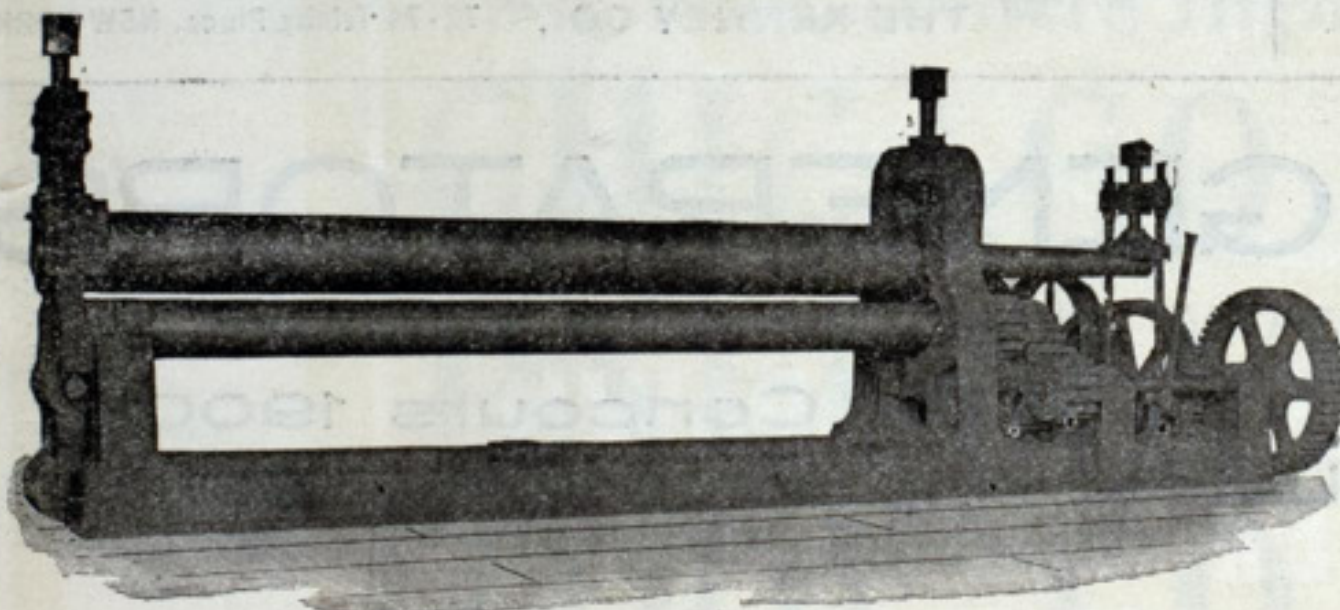
Quotations furnished by HERBERT WRIGHT & Co., Cleveland, date of December 12, 1900.

NAME OF STOCK.	OPEN	HIGH	LOW	CLOSE
American Steel & Wire.....	42½	45	42½	43¾
American Steel & Wire, Pfd.....	87	88¾	86¾	87¼
Federal Steel	52¼	53¾	51¾	52¾
Federal Steel, Pfd.....	76¾	77¾	76¾	77¼
National Steel	37½	39	37	38¾
National Steel, Pfd*.....	.....	.....	.....	.....
American Tin Plate	47¾	50½	47¾	49
American Tin Plate, Pfd.....	89¾	90	89¾	90
American Steel Hoop.....	30	31	29¾	30¼
American Steel Hoop, Pfd.....	78	79	78	78¼
Republic Iron & Steel	15¾	16¼	15¼	16
Republic Iron & Steel, Pfd.....	65½	65¾	65¼	65¾

*Ex Dividend 1½ per cent.

THIS CUT ILLUSTRATES OUR

POWER BENDING ROLLS



FOR BOILER MAKERS,
IRON WORKERS AND
SHIP BUILDERS.

These rolls will bend plate to a complete circle. The outer bearing of the upper roll is hinged, the upper roll being supported independently, so that plates bent to a circle are easily removed. We build these rolls in the standard sizes from 8 ft. 2 in. between the housings up to 12 ft. 2 in. between the housings, with capacity to bend from ¾ in. up to 5½ in. plate, full width.

If you are in the market for rolls heavier than we build we shall be pleased to figure on same.

THE CLEVELAND PUNCH AND SHEAR WORKS CO., CLEVELAND, O., U.S.A.

TUG FOR SALE.

Good Tug, six years old. Engines 18x20. Boiler allowed 130 pounds steam pressure. Address Box 284, Ashland, Wis. Dec. 27

MECHANICAL ENGINEER

with twenty-four years' practical experience with all kinds of marine and stationary engines and boilers is now open for engagement as manager, superintendent, foreman or chief draftsman of works. Highest testimonials and references produced. Apply Box 425, The Marine Review Pub. Co., Perry-Payne Bldg., Cleveland. Dec. 20

A MARINE ENGINE DRAFTSMAN

is wanted by the Petersburg Iron Works Co., Petersburg, Va. Give experience, qualifications and references with salary expected. Dec. 13

PATROL BOAT WANTED.

The Ohio Fish & Game Commission wants to buy a boat suitable for police patrol on the waters of Lake Erie. Send description and price of boat to A. J. Hazlett, Commissioner, Bucyrus, O. Dec. 20.

WORTHINGTON PUMP FOR SALE CHEAP.

Size 17x22x15 in. In good condition. Address American Ship Building Co., Cleveland, O. Dec. 20

FIVE ELECTRIC PASSENGER LAUNCHES FOR SALE.

In fine condition. Length over all, 35 feet. Seating capacity, 28. Send for price list. Yacht brokers, please note. Milwaukee Electric Launch Co., 1504 Monadnock Block, Chicago. tf

FERRY STEAMER WANTED.

Must be suitable for winter work. Send full information to "Ubique," care Marine Review Pub. Co., Perry Payne Bldg., Cleveland, O. Dec. 13.

PASSENGER STEAMER FOR SALE.

Length over all, 177 ft.; beam on water line, 29 ft.; beam on deck (concaved) 40 ft. Rebuilt in 1893. Carries 500 tons freight. Allowed 500 passengers; will sleep 120 and can be made to sleep 200. Good cabin outfit. Steeple compound engines, double fire-box boiler. Speed, 11½ miles. Reason for selling is that vessel is not speedy enough for present service. Address Passenger Steamer, tf THE MARINE REVIEW PUB. CO., Cleveland.

WANTED TO PURCHASE, RENT OR CHARTER.

Tug and scows, capacity of the latter to be 1,000 to 1,500 tons. Steam-barge owners correspond. Stone to be transported from our pier at Stone Haven, 7 miles north of Port Washington, to Lake Michigan ports. Lake Shore Stone Co., Belgium, Ozaukee Co., Wis. tf

**SHELBY SEAMLESS COLD-DRAWN
STEEL BOILER TUBES** ARE
FREE FROM SEAMS AND ALL OTHER IMPERFECTIONS
ARE MORE DENSE, TOUGH AND DUCTILE, ARE TRUER TO
GAUGE, CLEAN BETTER STEAM BETTER, WORK
BETTER AND LAST LONGER THAN ANY OTHER
THEY DO NOT CRACK NOR FAIL AT THE ENDS

 **WRITE FOR NEW CATALOGUE**

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GENERAL SALES OFFICE. AMERICAN TRUST BUILDING
BRANCH OFFICES:
NEW YORK CHICAGO

BURRELL & FOWLER - CLEV'D O.

Dearborn Vegetable Boiler Compounds.

SCIENTIFICALLY AND UNIFORMLY MADE. EVER RELIABLE.

Most Scientifically equipped, Complete, Handsome and expensively Furnished Laboratories, and the ONLY EXCLUSIVE LABORATORIES ON STEAM ECONOMY in the Country.

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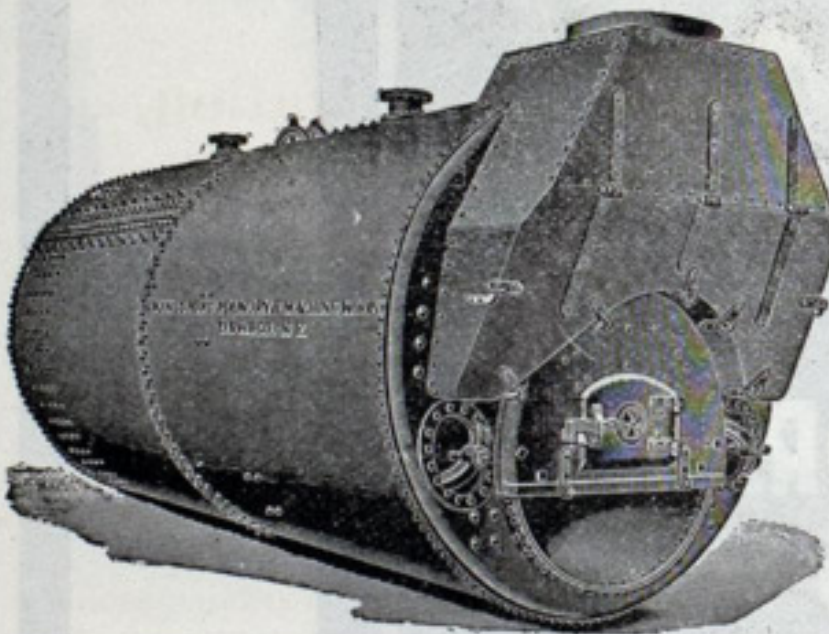


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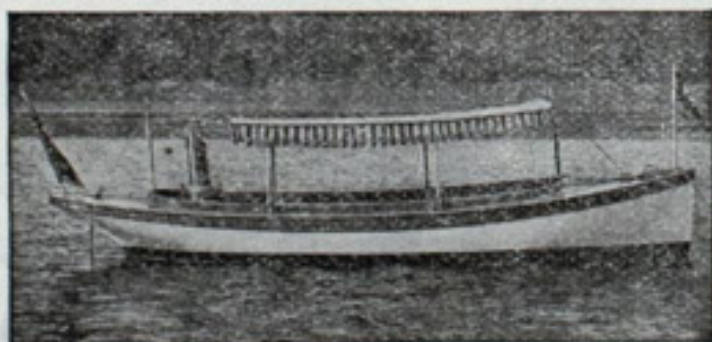
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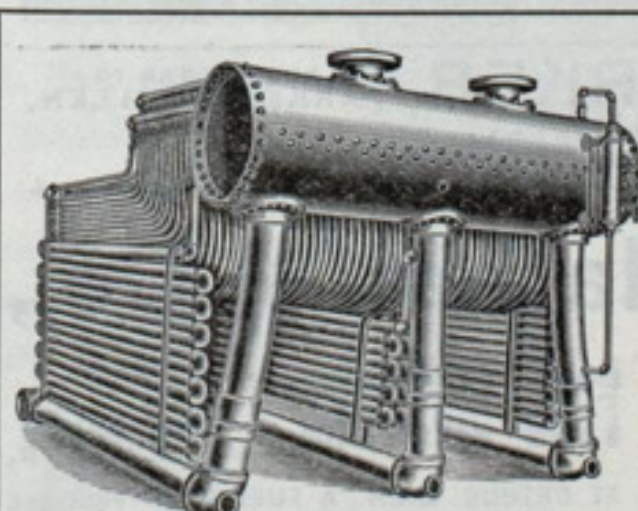
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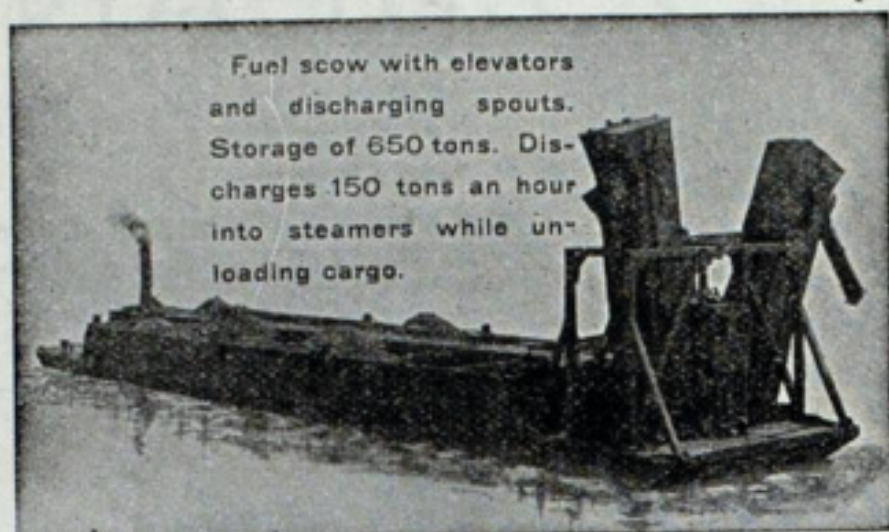
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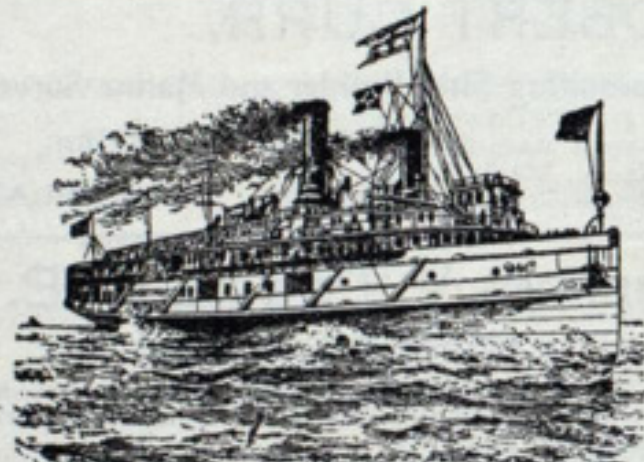
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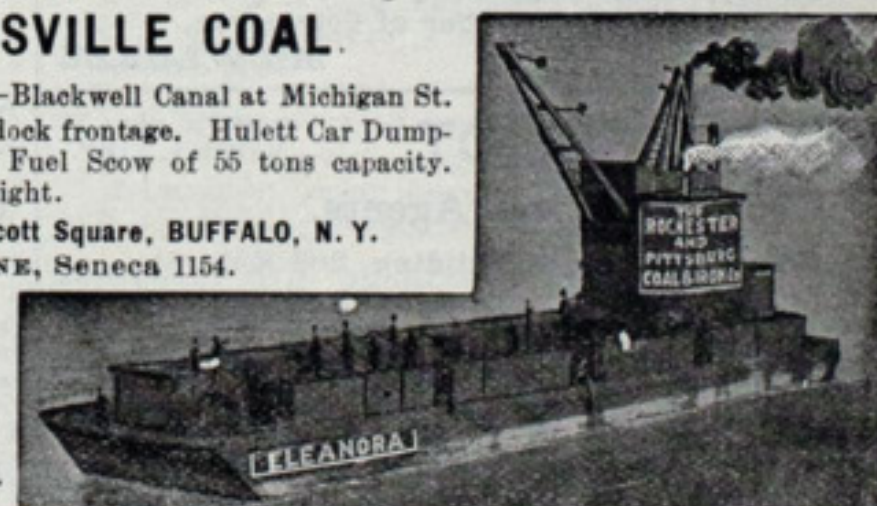
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 Morse Iron Works & Dry Dock Co.....Brooklyn.
 Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.
 Newport News Ship Building Co.....Newport News, Va.
 Nixon, Lewis.....Elizabeth, N. J.
 Phosphor Bronze Smelting Co., Ltd.....Philadelphia.
 Pusey & Jones Co.....Wilmington, Del.
 Risdon Iron Works.....San Francisco.
 Sheriffs Mfg. Co.....Milwaukee.
 Trigg, Wm. R. Co.....Richmond, Va.
 Trout, H. G.....Buffalo.
 Union Iron Works.....San Francisco.

PROJECTORS, ELECTRIC.

Elwell-Parker Electric Co.....Cleveland.
 General Electric Co.....Schenectady, N. Y.
 Rushmore Dynamo Works.....Jersey City, N. J.
 Westinghouse Electric & Mfg. Co.....Pittsburg.

PUMPS FOR VARIOUS PURPOSES.

Blake, Geo. F. Mfg. Co.....New York.
 Davidson, M. T.....Brooklyn, N. Y.
 Kingsford Foundry & Machine Works.....Oswego, N. Y.
 Wood, R. D. & Co.....Philadelphia.
 Worthington, Henry R.....New York.

PUNCHES, RIVETERS, SHEARS.

Cleveland Punch & Shear Works Co.....Cleveland.
 New Doty Mfg. Co.....Janesville, Wis.
 Niles Tool Works Co.....Hamilton, O.
 Wood, R. D. & Co.....Philadelphia.

REGISTER FOR CLASSIFICATION OF VESSELS.

Great Lakes Register.....Cleveland.

RELEASING HOOKS FOR DETACHING BOATS.

Standard Automatic Releasing Hook Co.....New York.

RIVETS, STEEL, FOR SHIPS AND BOILERS.

Bourne-Fuller Co.....Cleveland.
 Champion Rivet Co.....Cleveland.

RIGGING ROPE (WIRE).

American Steel & Wire Co.....Chicago.

RUBBER INSULATED WIRES.

Roebbing's Sons, John A.....New York and Cleveland.
 American Steel & Wire Co.....Chicago.

SAFETY VALVES.

American Steam Gauge Co.....Boston.
 Ashton Valve Co.....Boston.
 Crosby Steam Gage & Valve Co.....Boston.

SAIL MAKERS.

Baker, Howard H. & Co.....Buffalo.
 Upson-Walton Co.....Cleveland.
 Wilson & Silsby.....Boston.

SALVAGE COMPANIES.

See wrecking companies.

SCHOOLS, CORRESPONDENCE—ENGINEERING AND NAVIGATION.

American School of Correspondence.....Boston.
 Buffalo Nautical School.....Buffalo.
 Chicago Nautical School.....Chicago.

SCREW MACHINES.

Niles Tool Works Co.....Hamilton, O.

SEARCH LIGHTS.

Elwell-Parker Electric Co.....Cleveland.
 General Electric Co.....Schenectady, N. Y.
 Rushmore Dynamo Works.....Jersey City, N. J.
 Westinghouse Electric & Mfg. Co.....Pittsburg.

SHAPERS.

Niles Tool Works Co.....Hamilton, O.

SHEARS.

See punches, riveters and shears.

SHIP AND BOILER PLATES AND SHAPES.

Bourne-Fuller Co.....Cleveland.

SHIP BUILDERS.

American Ship Building Co.....Cleveland.
 Atlantic Works.....East Boston, Mass.
 Bath Iron Works, Ltd.....Bath, Me.
 Buffalo Dry Dock Co.....Buffalo.
 Cramp, Wm. & Sons.....Philadelphia.
 Craig Ship Building Co.....Toledo, O.
 Chicago Ship Building Co.....Chicago.
 Detroit Shipbuilding Co.....Detroit.
 Fore River Engine Co.....Weymouth, Mass.
 Hardy, John B.....Tacoma, Wash.
 Harlan & Hollingsworth Co.....Wilmington, Del.
 Jenks Ship Building Co.....Port Huron, Mich.
 Lockwood Mfg. Co.....East Boston, Mass.
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 Moran Bros. Co.....Seattle, Wash.
 Morse Iron Works & Dry Dock Co.....Brooklyn.
 Neafie & Levy Ship & Engine Bldg. Co.....Philadelphia.
 Newport News Ship Building Co.....Newport News, Va.
 Nixon, Lewis.....Elizabeth, N. J.
 Pusey & Jones Co.....Wilmington, Del.
 Risdon Iron Works.....San Francisco.
 Roach's Ship Yard.....Chester, Pa.
 Townsend & Downey Ship Bldg. Co.....New York.
 Trigg, Wm. R. Co.....Richmond, Va.
 Union Dry Dock Co.....Buffalo.
 Union Iron Works.....San Francisco.
 Willard, Chas. P. & Co.....Chicago.

SHIP CHANDLERS.

Baker, Howard H. & Co.....Buffalo.
 Moran Bros. Co.....Seattle, Wash.
 Upson-Walton Co.....Cleveland.

SPARS—LARGE SIZES.

Moran Bros. Co.....Seattle, Wash.

STAYBOLTS, IRON OR STEEL, HOLLOW OR SOLID.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

STEAM VESSEL FOR SALE.

Holmes, Samuel.....New York.

STEEL OR IRON STAYBOLTS, HOLLOW OR SOLID.

Falls Hollow Staybolt Co.....Cuyahoga Falls, O.

BUYERS' DIRECTORY OF THE MARINE TRADE.—Continued.

STEAMSHIP LINES, PASS. AND FREIGHT.

American Line.....New York.
 Erie & Western Trans. Co.....Buffalo.
 International Nav. Co.....Philadelphia.
 Red Star Line.....New York.

STEEL SHAFTS, SOLID OR HOLLOW.

Bethlehem Steel Co.....South Bethlehem, Pa.

STEERING APPARATUS.

American Ship Building Co.....Cleveland.
 Chase Machine Co.....Cleveland.
 Detroit Shipbuilding Co.....Detroit.
 Electro-Dynamic Co.....Philadelphia.
 Hyde Windlass Co.....Bath, Me.
 Jenks Ship Building Co.....Port Huron, Mich.
 Queen City Engineering Co.....Buffalo.
 Sheriffs Mfg. Co.....Milwaukee.

STOCKS, BONDS, SECURITIES.

Wright, Herbert & Co.....Cleveland.

STOCKLESS ANCHORS.

Baldt Anchor Co.....Chester, Pa.
 International Anchor Co.....Cleveland.

STRUCTURES OF STEEL, BUILDERS OF.

American Bridge Co.....New York.

SURVEYORS, MARINE.

Curr, Robert.....Cleveland.
 Gibbs & Joys.....Milwaukee.

TELEGRAPH—DECK AND ENGINE ROOM.

Cory, Chas. & Son.....New York.

TESTS OF MATERIAL.

Hunt, Robert W. & Co.....Chicago.
 Pittsburgh Testing Laboratory, Ltd.....Pittsburg.

THERMOMETERS FOR MECHANICAL PURPOSES.

Helios-Upton Co.....Peabody, Mass.

TIMBER—LARGE PIECES.

Moran Bros. Co.....Seattle, Wash.

TOOLS, METAL WORKING, FOR SHIP AND ENGINE WORKS.

Chicago Pneumatic Tool Co.....Chicago.
 Cleveland Pneumatic Tool Co.....Cleveland.
 Cleveland Punch & Shear Works Co.....Cleveland.
 New Doty Mfg. Co.....Janesville, Wis.

Niles Tool Works Co.....Hamilton, O.
 Philadelphia Pneumatic Tool Co.....Philadelphia.
 Standard Pneumatic Tool Co.....Chicago.
 Wood, R. D. & Co.....Philadelphia.

TOOLS, WOOD WORKING.

Fay & Egan Co., J. A.....Cincinnati, O.
 Atlantic Works, Inc.....Philadelphia.

TRUCKS.

Boston & Lockport Block Co.....Boston.

TOWING MACHINES.

American Ship Windlass Co.....Providence, R. I.
 Chase Machine Co.....Cleveland.
 Playfair's Barge & Tug Line.....Midland, Ont.

TOWING COMPANIES.

Donnelly Salvage & Wrecking Co.....Kingston, Ont.
 Swain Wrecking Co.....Detroit.

TUBING FOR BOILERS.

Shelby Steel Tube Co.....Cleveland.

VALVES, STEAM SPECIALTIES, ETC.

American Steam Gauge Co.....Boston.
 Ashton Valve Co.....Boston.
 Crosby Steam Gauge & Valve Co.....Boston.
 Jenkins Bros.....New York.

VARNISH MAKERS, COLOR GRINDERS, ETC.

Smith, Edward & Co.....New York.

VARNISH PAINT.

Mair, John & Son.....Philadelphia.

VESSEL AND FREIGHT AGENTS.

Boland, John J.....Buffalo.
 Brown & Co.....Buffalo.
 Drake & Maytham.....Buffalo.
 Elphicke, C. W. & Co.....Chicago.
 Gibbs & Joys.....Milwaukee.
 Hall & Root.....Buffalo.
 Hawgood & Moore.....Cleveland.
 Helm, D. T. & Co.....Duluth, Minn.
 Holmes, Samuel.....New York.
 Hutchinson & Co.....Cleveland.
 Keith, J. G. & Co.....Chicago.
 Mitchell & Co.....Cleveland.
 Moffat & O'Brien.....San Francisco.

Pauly, H. J.....Milwaukee.
 Richardson, W. C.....Cleveland.

VENTILATING APPARATUS FOR SHIPS.

Buffalo Forge Co.....Buffalo.
 Sturtevant, B. F. Co.....Boston.

WIRE ROPE AND WIRE ROPE FITTINGS.

American Steel & Wire Co.....Chicago.
 Baker, H. H. & Co.....Buffalo.
 Roebling's Sons, John A.....New York and Cleveland.
 Upson-Walton Co.....Cleveland.

WHISTLES, STEAM.

American Steam Gauge Co.....Boston.
 Ashton Valve Co.....Boston.
 Crosby Steam Gauge & Valve Co.....Boston.
 Signal & Control Co.....New York.

WINDLASSES.

American Ship Windlass Co.....Providence, R. I.
 American Ship Building Co.....Cleveland.
 Hyde Windlass Co.....Bath, Me.
 Jenks Ship Building Co.....Port Huron, Mich.

WINCHES.

American Ship Windlass Co.....Providence, R. I.
 Hyde Windlass Co.....Bath, Me.

WOOD WORKING MACHINERY.

Fay & Egan Co., J. A.....Cincinnati, O.
 Atlantic Works, Inc.....Philadelphia.

WORM GEARING.

Morse, Williams & Co.....Philadelphia.

WRECKING AND SALVAGE COMPANIES.

Donnelly Salvage & Wrecking Co.....Kingston, Ont.
 Playfair's Barge & Tug Line.....Midland, Ont.
 Swain Wrecking Co.....Detroit.

YACHT SAILS, FITTINGS, HARDWARE, ETC.

Wilson & Silsby.....Boston.

YACHT AND BOAT BUILDERS.

Drein, Thos. & Son.....Wilmington, Del.
 Gas Engine & Power Co.....New York.
 Lane & DeGroot.....Brooklyn.
 Willard, Chas. P. & Co.....Chicago.

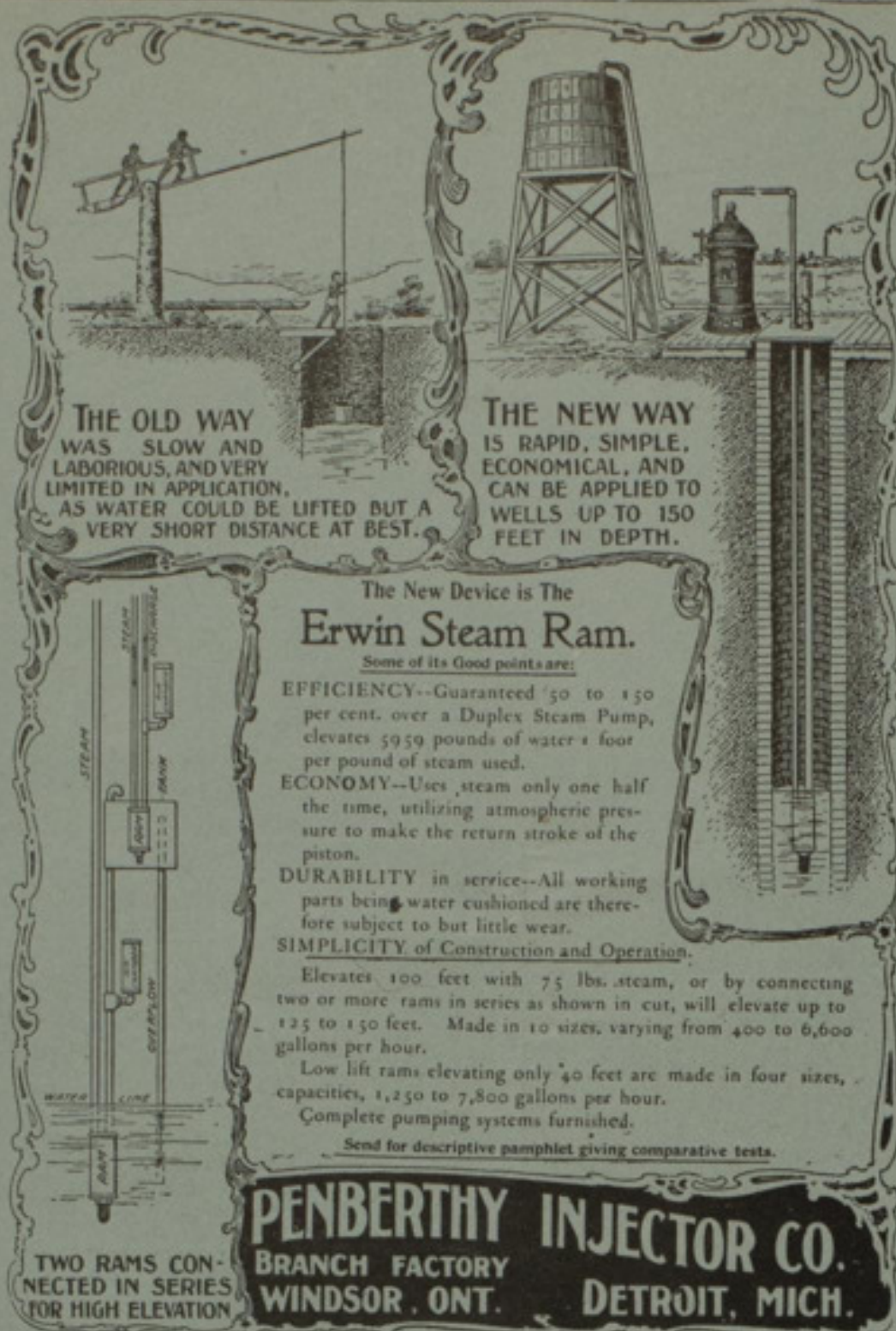
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No. 2, Day Express		*19 05 pm	*19 20 pm
No. 26, Night Express		*7 30 am
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No. 15, New York, Boston & Chicago Special...		*3 05 am	*3 10 am
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No. 7, Day Express			*6 30 am
No. 19, The Lake Shore Limited		*7 35 am	*7 40 am
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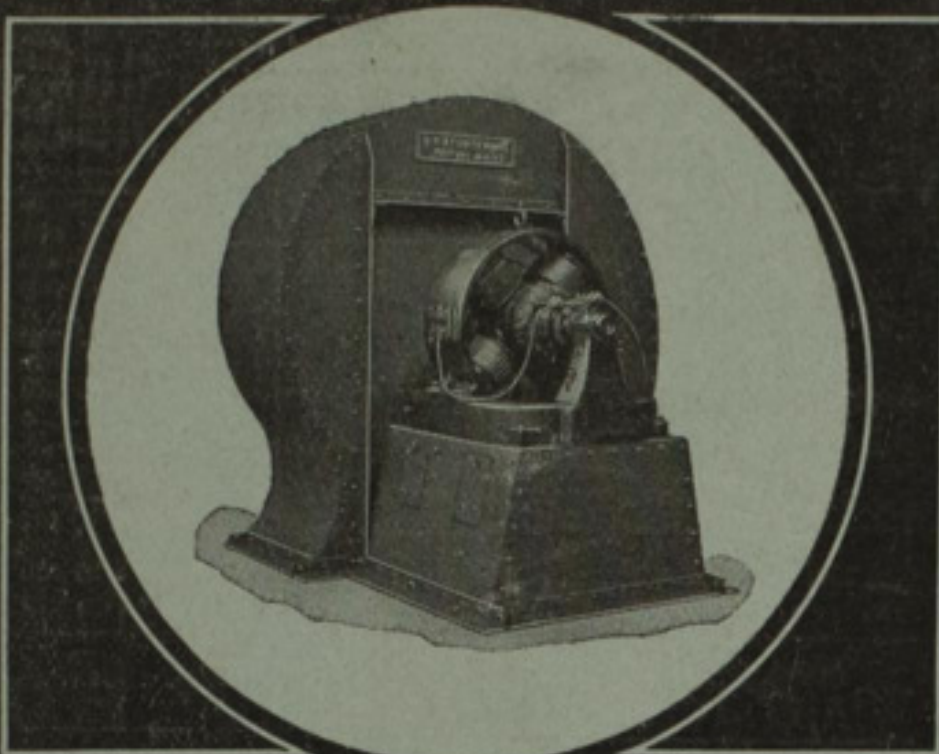
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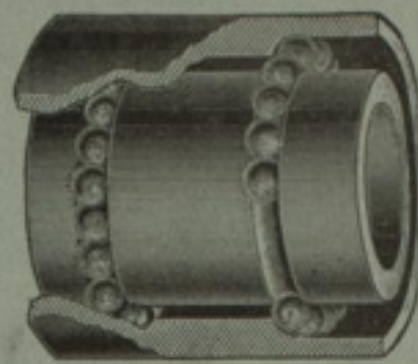


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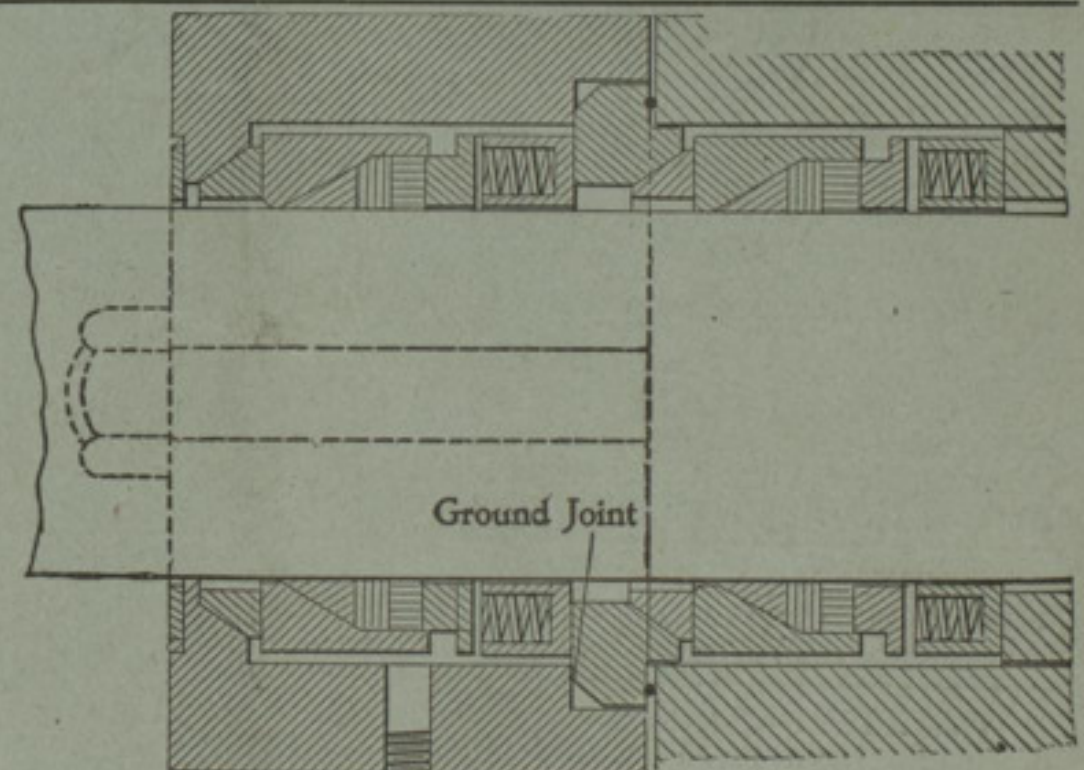
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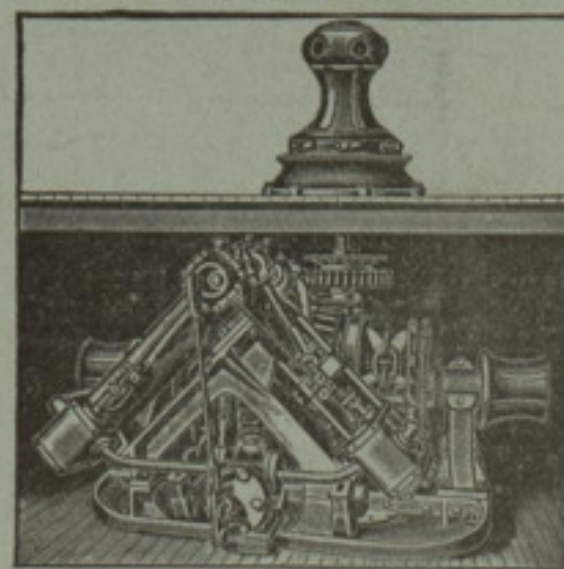
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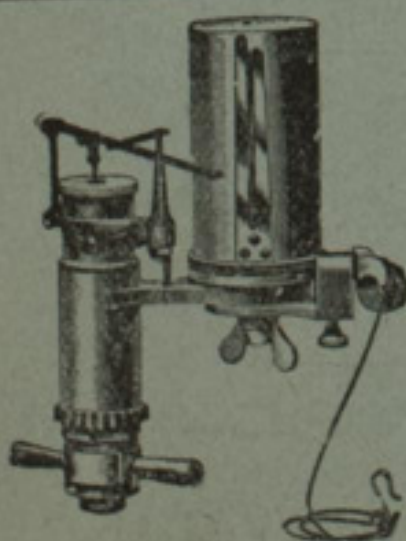
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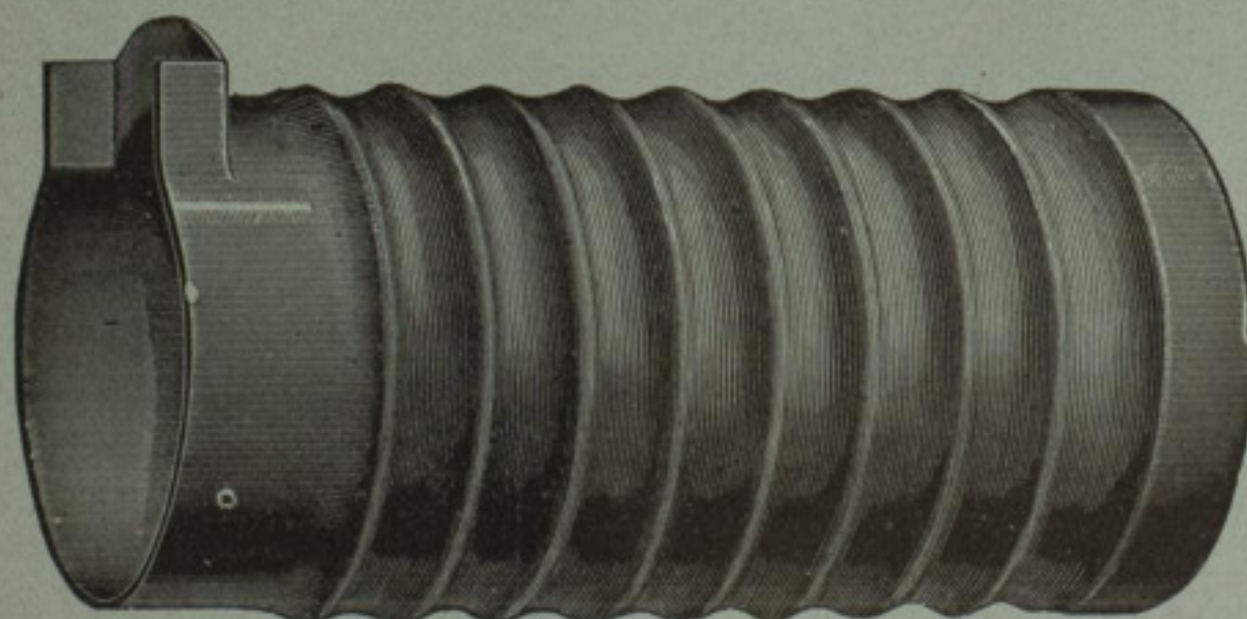
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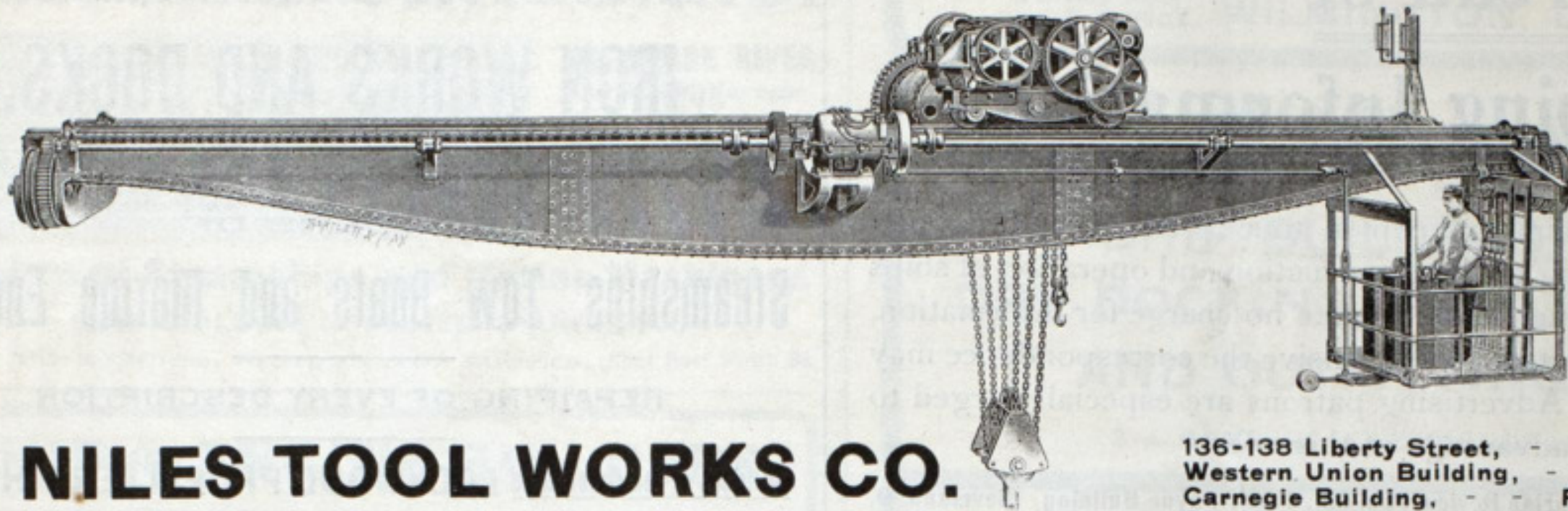
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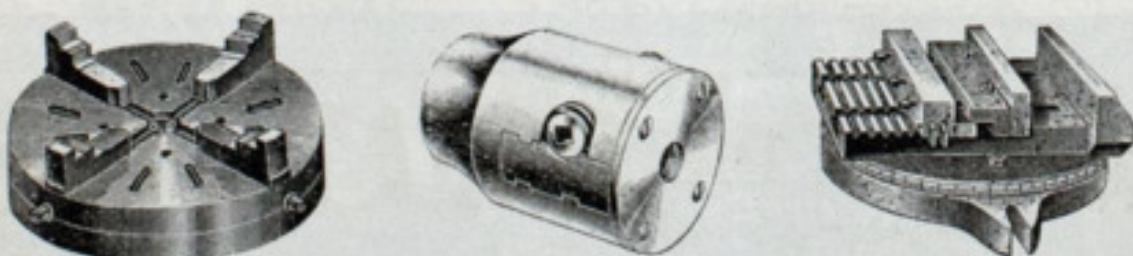
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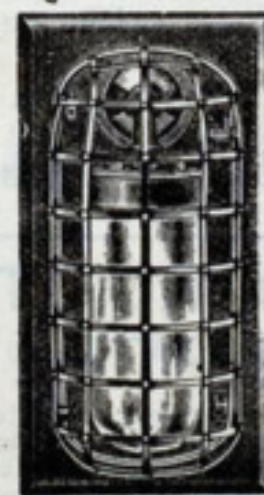
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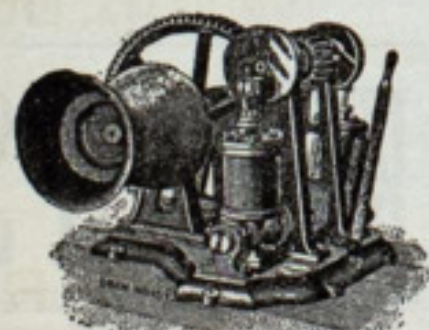
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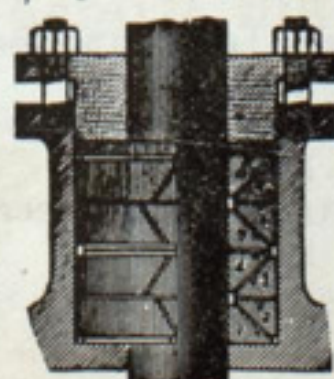
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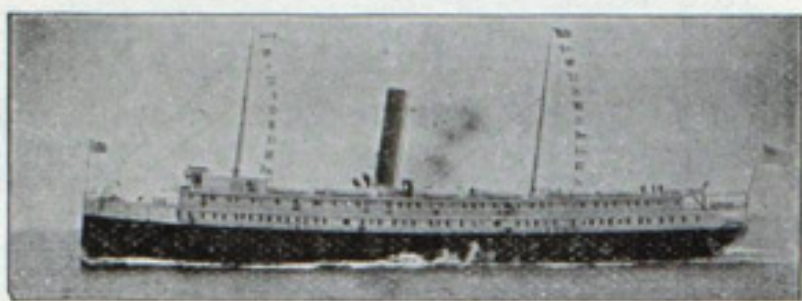
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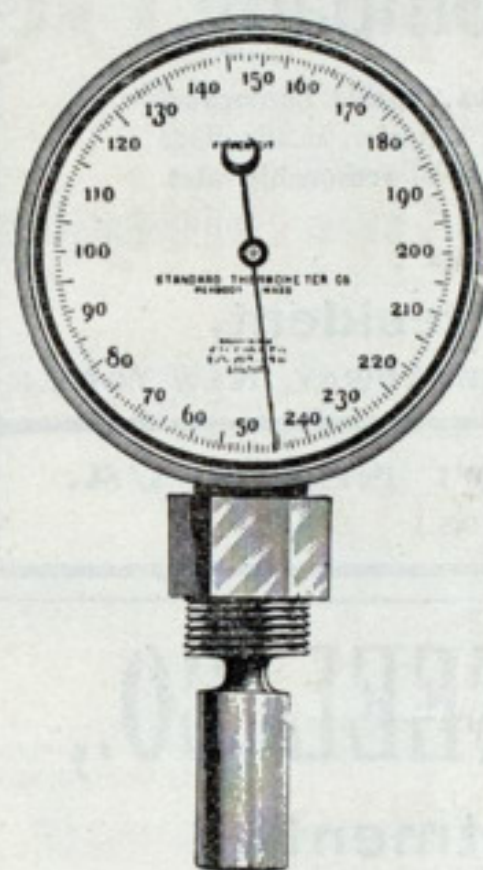
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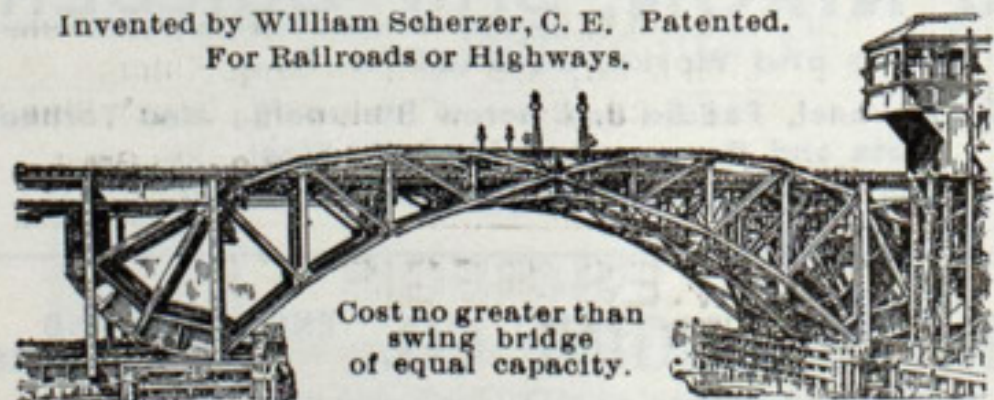
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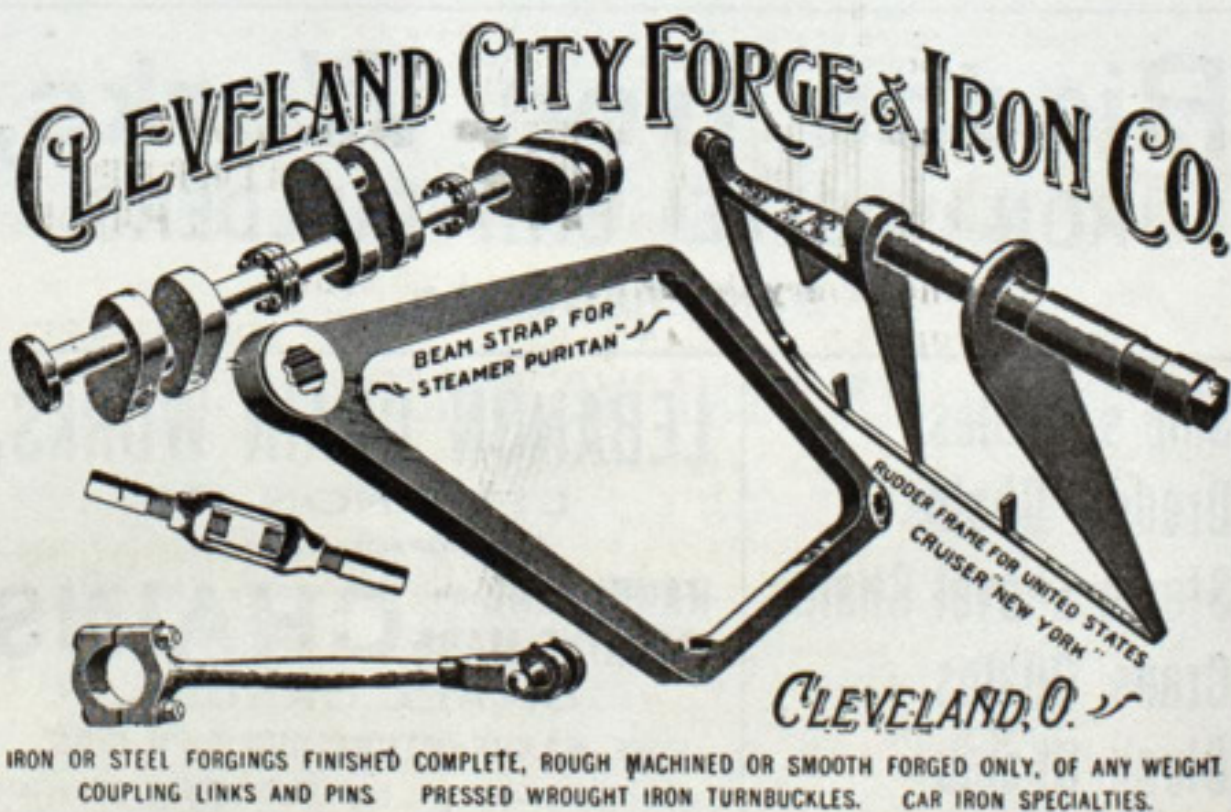
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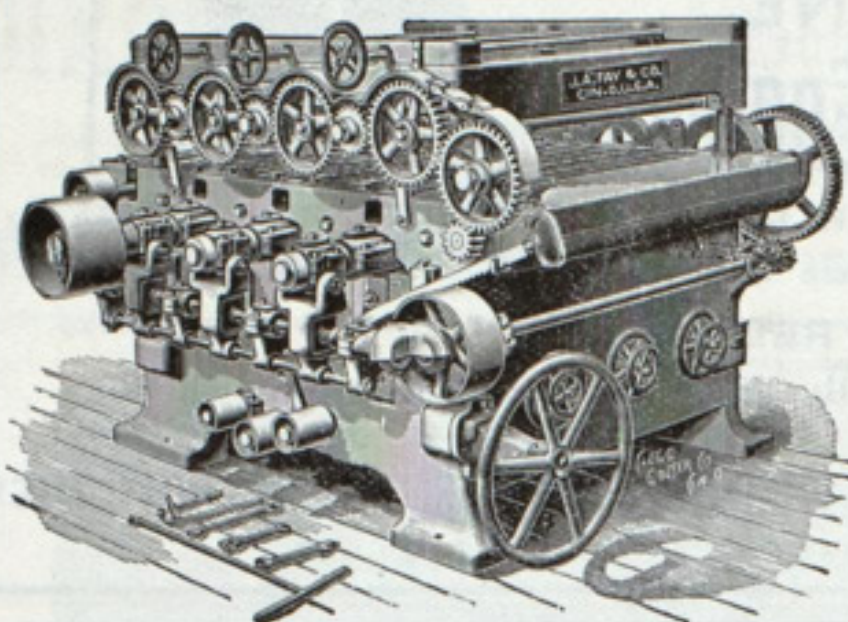
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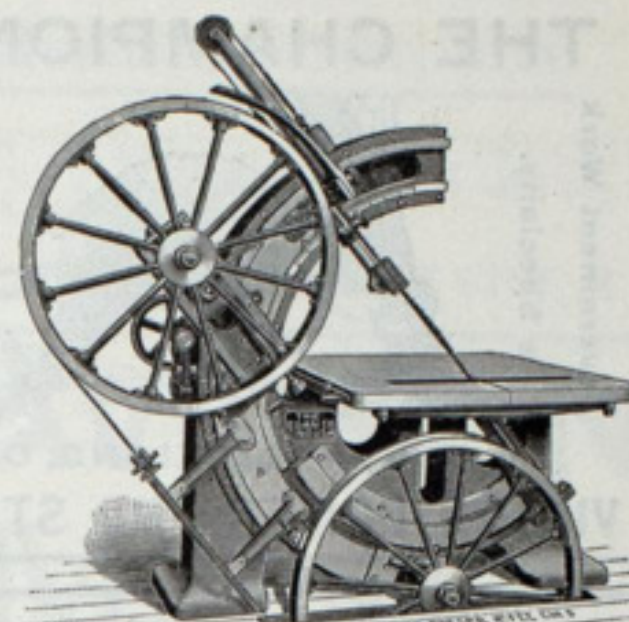
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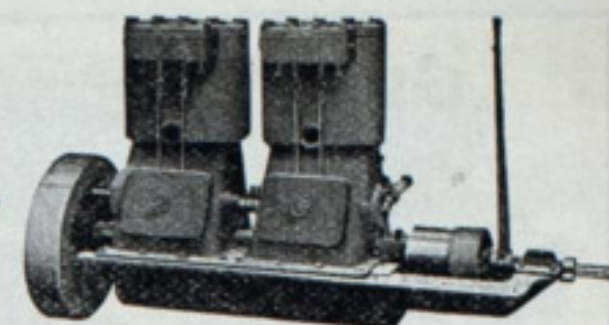
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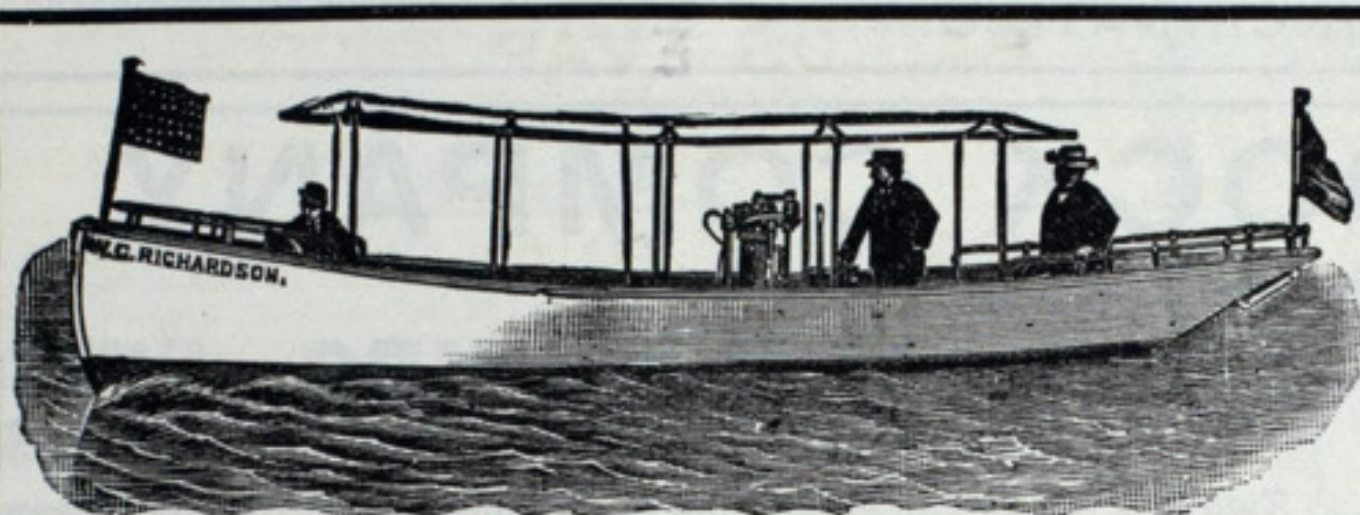
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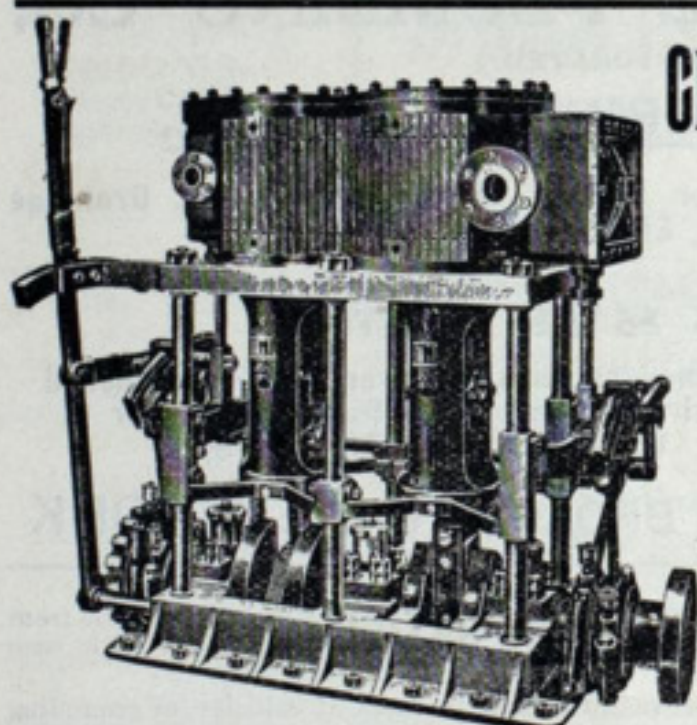
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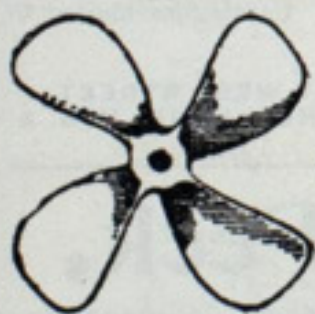


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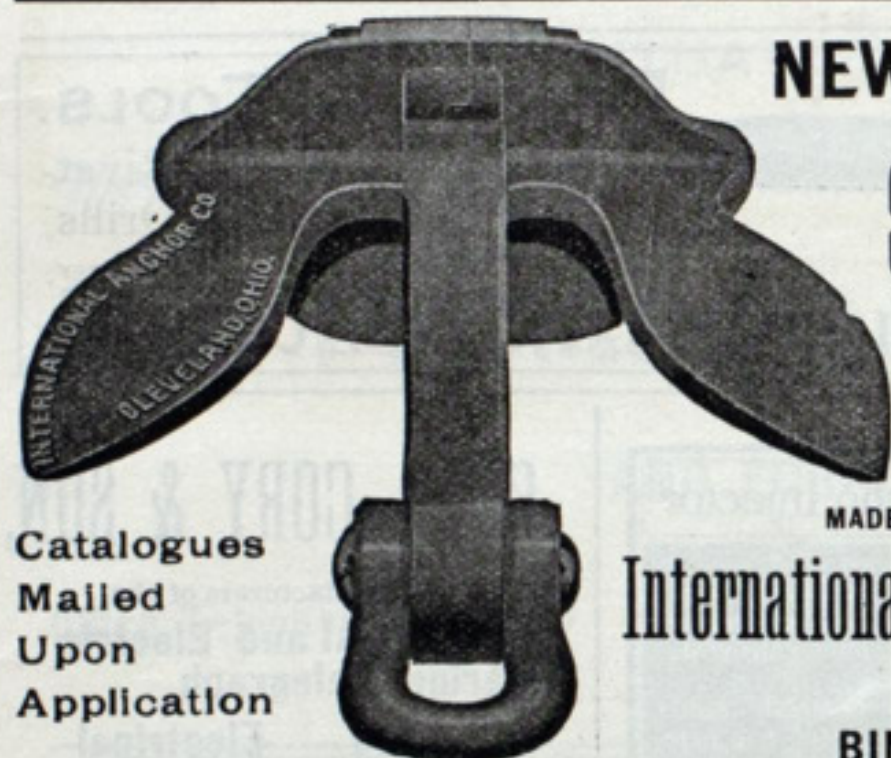
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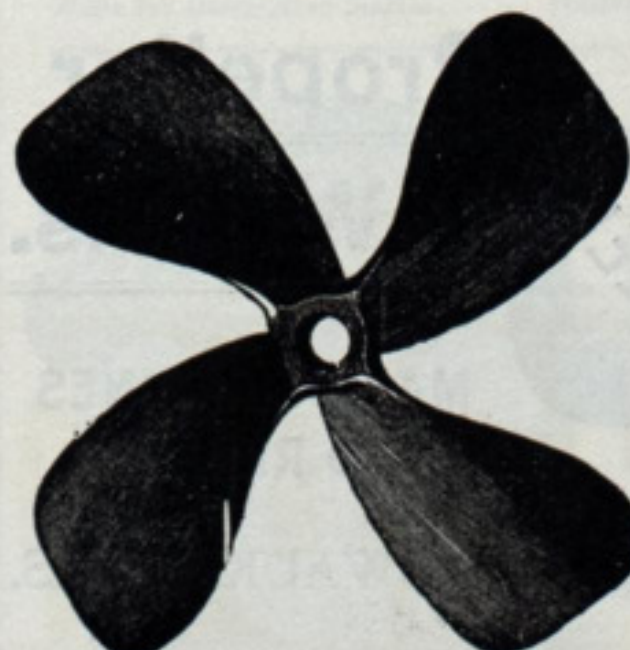
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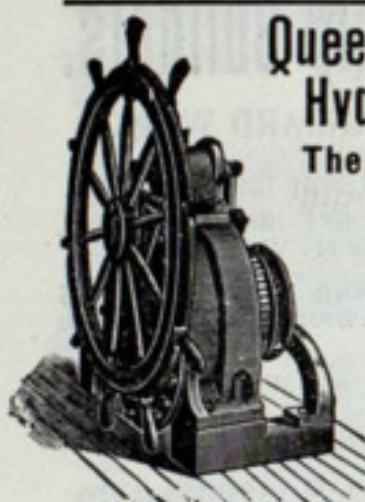
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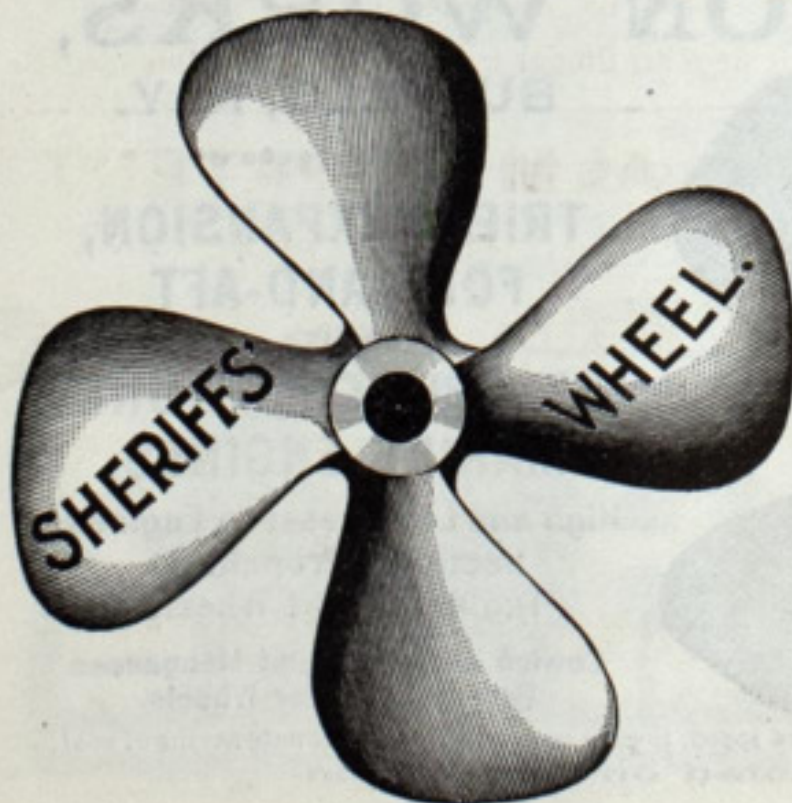
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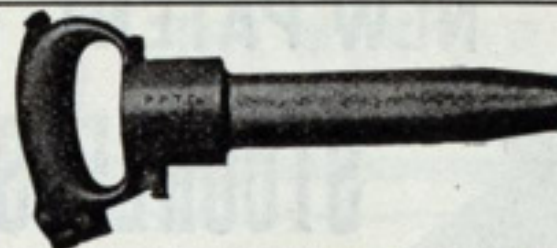
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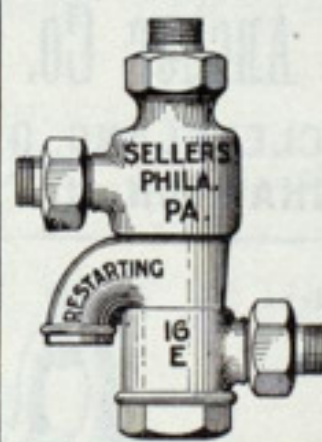


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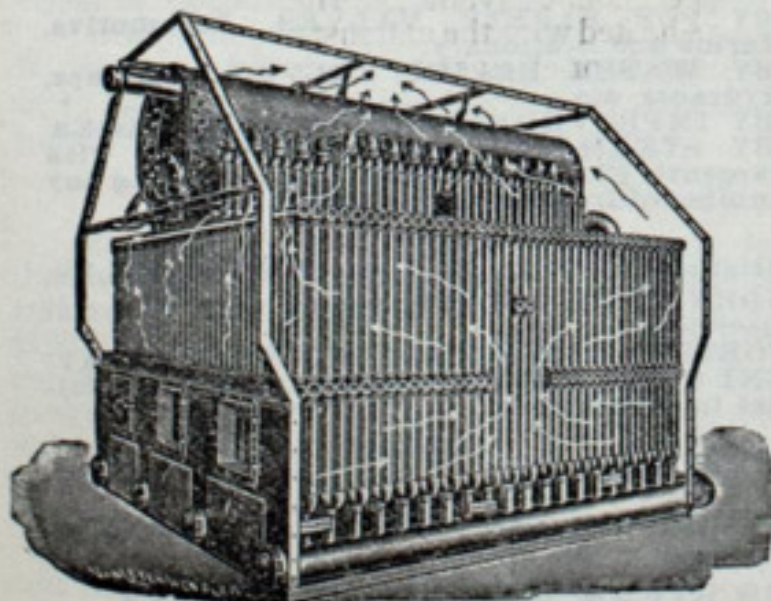
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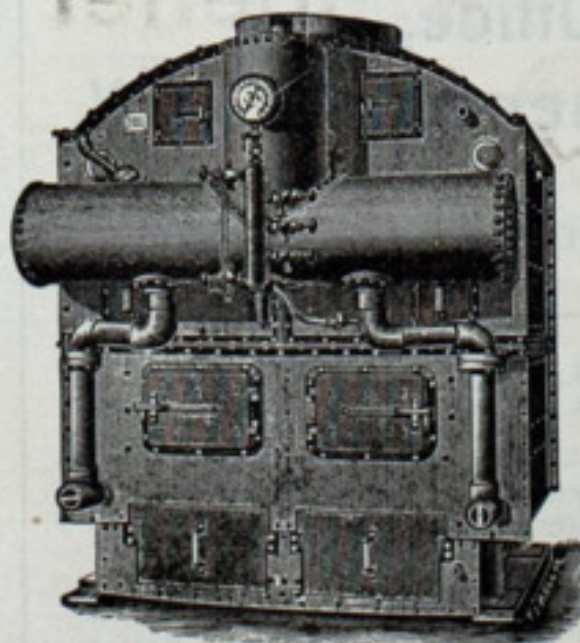
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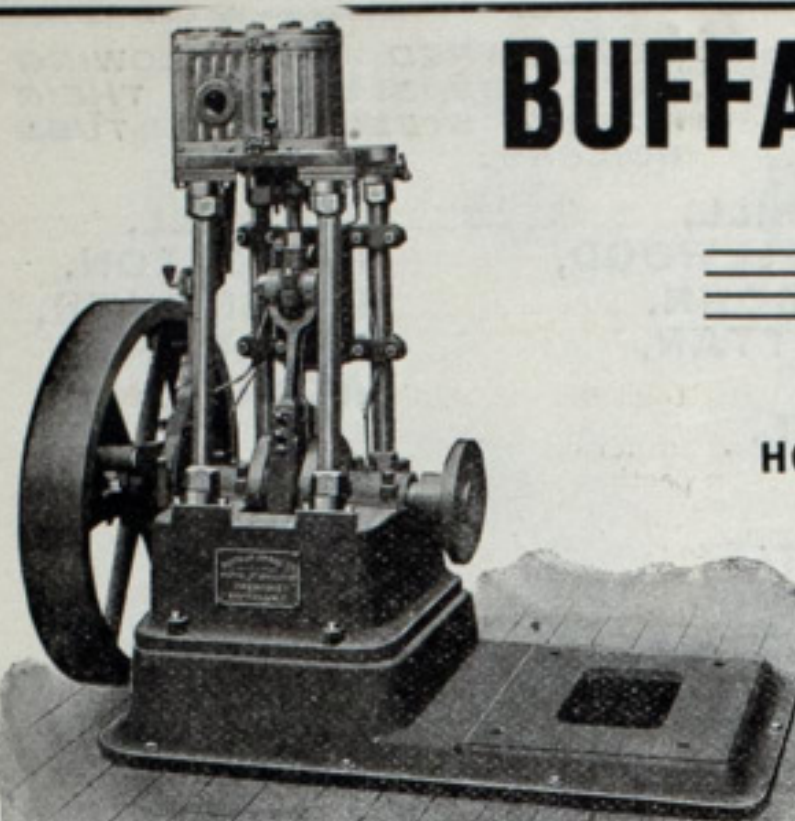
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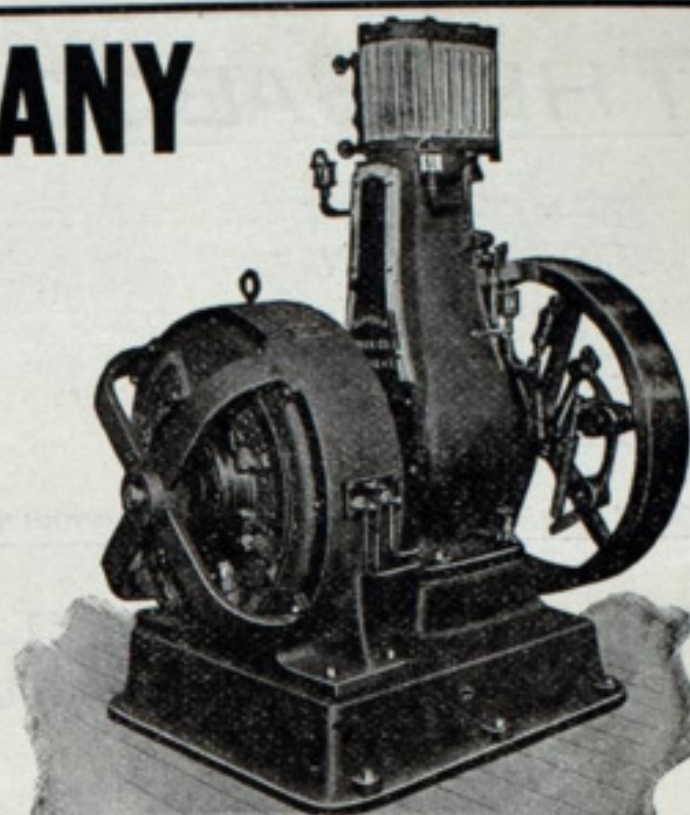
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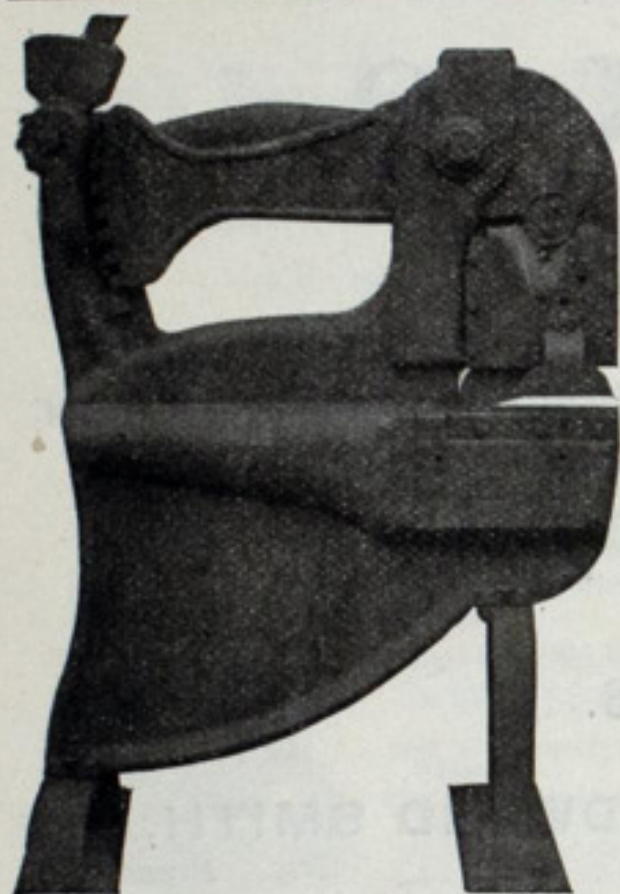
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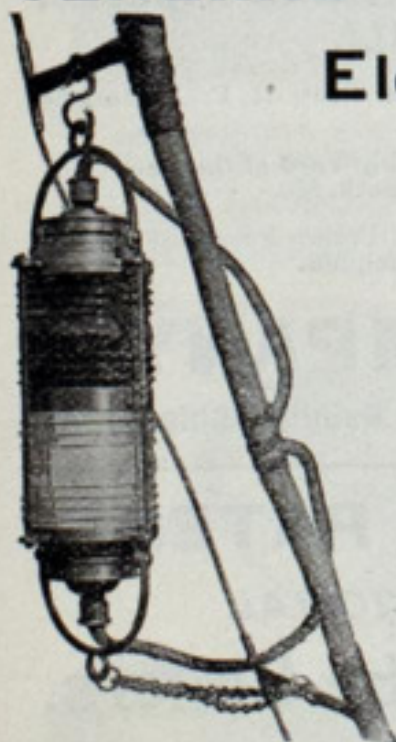
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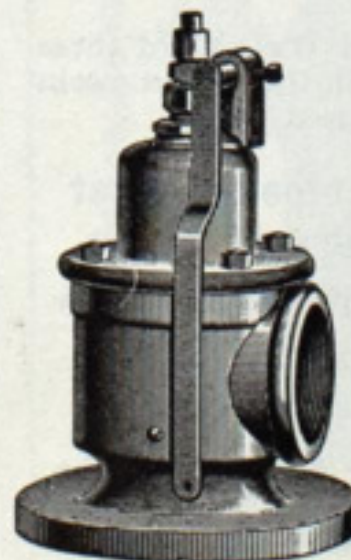
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